Transnational review of visual standards for driving: how Australia compares with the rest of the world

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ABSTRACT

Importance: Driving is a highly visual task and a primary mode of transportation for many people around the world.

Background: There appears to be little uniformity of vision standards across the world for driving. We reviewed the basic screening visual requirements for obtaining standard private and commercial driving licences for a total of 70 jurisdictions, and reviewed the evidence behind these standards.

Design: Systematic review of basic screening vision standards worldwide for driving and literature review.

Samples: Published online documentation on visual acuity and field requirements for driving.

Methods: Journal articles, government reports and websites obtained via a Google search were used to review the regulations for driving. This was limited by the comprehensiveness of resources, and countries were excluded if the requirements were unclear or unattainable. A literature review was performed using Medline with keywords vision, driving and visual field.

Main Outcome Measures: Visual parameters used for driving assessment.

Results: The results suggest significant variations across the world. The visual acuity requirements for a private licence ranges from a minimum of 6/9 to 6/60. The minimum binocular horizontal field requirement ranges from 110° to 150°. In general, standards for a commercial licence are stricter compared to a private

licence. A literature review could not support the current driving standards as evidence-based.

Conclusions and Relevance: The disunity of driving vision requirements worldwide likely reflects the inconclusive evidence base. Accounting for individual differences and the ability to predict individual risk is important in the context of determining driving licensure.

Key Words: driving; vision; eye disease; vision standards; visual acuity

1. INTRODUCTION

Driving is a highly visual task and a primary mode of transportation internationally. With the advent of ride-sharing technology becoming widespread around the globe, private drivers are increasingly acting as commercial drivers. The acceptance of international driving permits in over 130 countries worldwide gives motorists the ability to drive internationally without further tests if their domestic licence is valid. Consequently, there is a need for an international approach in understanding the visual standards for driving.

Currently, visual acuity and visual field tests form the foundation of many driver licencing screening assessments worldwide. Despite extensive research investigating the role of vision in driving, evidence to support these tests as accurate indicators of driver safety or performance is still lacking. Furthermore, previous studies examining the visual standards for driving across the United States of America (USA) and Europe report significant variation between jurisdictions.^{1,2}

We compare the screening visual requirements for holding both private and commercial drivers' licence across the world, and examine the evidence behind these regulations.

2. METHODS

2.1 A comparison of minimum screening visual requirements for a standard licence

The requirements for obtaining a driving licence were obtained via online Google searches. Information was gathered from available journal articles, government reports and websites (Table 1). Bibliographies from websites were also reviewed for further relevant information sources. Table 3 details our search method for each continent. Jurisdictions were search individually using a combination of the jurisdiction's name with search terms including "driving", "minimum", "vision", "acuity", "visual field", "eyesight" or the country's licensing agency (e.g. "DVLA"). We aimed to obtain standards for countries worldwide so that there is representation from all continents. Our search was limited by the lack of resources available online and the results attainable in English using an English Google search. A total of 70 jurisdictions were included.

2.2 The evidence base – literature search

2.2.1 Search Strategy and Information sources

MEDLINE was searched without publication year or publication status restrictions and limited to articles in English. Two separate searches were carried out by using the terms "visual field" and "automobile driving", and, "visual acuity" and "automobile driving". The reference lists of identified studies were also screened for potentially relevant papers.

2.2.2 Selection Criteria

Randomised controlled trials, cohort studies, case-control studies and government reports were all considered for inclusion. Studies considered for review had the following characteristics: (i) drivers aged 18 years and older, (ii) participants with decreased visual acuity or visual field, (iii) driving performance as an outcome determined by driving simulator performance or an on-road driving assessment, or driving safety as an outcome, determined by motor vehicle crash rates.

2.2.3 Data Collection and Analysis

The titles and abstracts of retrieved results were screened to determine whether they met inclusion criteria. The full text of all potentially relevant studies were obtained and the results are narratively described.

3. RESULTS

3.1 Comparison and summary of visual standards: private licences

3.1.1 Basic visual acuity requirements

Visual acuity (VA) testing appears to be a universal basic screening requirement to hold a licence. There is some uniformity in VA standards worldwide, particularly in higher income countries. (See Table 4). A baseline binocular best corrected visual acuity (BCVA) of 6/12 or equivalent on the Snellen chart is required in Australia, the United Kingdom (UK) and the European Union (EU).

The majority of states in the USA require a minimum BCVA of 20/40 using both eyes. (See Table 5) New Jersey requires a slightly lower BCVA of 20/50, while Georgia and Kentucky require an even lower BCVA of 20/60. In Florida, applicants with 20/50 vision or worse in either eye, with or without correction, are referred to

an ophthalmologist. If a minimum BCVA of 20/70 in either eye can be achieved, a licence may be granted.

Functional vision assessment is also performed in some countries. In the UK, drivers must be able to read a car number plate from 20 meters in addition to a BCVA of 6/12. The ability to read a number plate from 23 metres with or without correction alone, is used for licensure in Hong Kong.

3.1.2 Basic visual field requirements

The visual field (VF) standards to hold a licence vary significantly worldwide (See Tables 4 and 5). Some jurisdictions do not include VF requirements, while others have specific requirements for the horizontal and vertical field. In general, stricter laws govern the licensure in higher income compared to lower income countries.

3.1.2.1 North America

The basic VF requirements to hold a standard licence within the USA are highly variable (See Table 5). The majority of the states assess a binocular VF, and a minimum of 140° in the horizontal meridian is a common standard. Some states also have minimum requirements for each eye. Kentucky is the only state that specifies conditions for the vertical field extent. In contrast, VF testing is not used in the basic assessment for licensure in California, Alaska, Delaware, Idaho and New Jersey.

3.1.2.2 South America

Similar to some nations in the Commonwealth and Asia, Colombia also has a minimum horizontal field standard of 120°.

3.1.2.3 Commonwealth Countries

Many Commonwealth countries including the UK, Singapore and Canada share a minimum VF requirement of 120° in the horizontal meridian (See Table 4). VF testing is not required in Singapore unless the driver is monocular – defined as VA worse than 6/36 in one eye. In 2010, Australia revised its minimum horizontal requirement from 120° to 110° in order to accommodate for monocular drivers in obtaining a private licence. In addition, no defects are to be present within a radius of the central 20°. However, a scattered or single cluster of up to three contiguous spots within the central field is acceptable. This exception arose when an individual missing three contiguous points successfully argued in a legal case that his scotoma was no larger than that of the blind spot in a monocular driver.

3.1.2.4 European Countries

Countries within Europe currently have their own regulations, but there is a movement towards harmonisation. The EU minimum recommendation is 120° along the horizontal field, at least 50° left and right, and 20° in the vertical meridian. Additionally, no defects are to be present within a radius of the central 20°.

3.1.2.5 Asia

The VF requirements differ substantially across Asia (See Table 4). Jurisdictions including China, Hong Kong and Malaysia do not assess VF routinely, while Taiwan requires a minimum horizontal field of 150° – one of the highest standards in the world. Japan also requires a horizontal field of 150°, but in monocular drivers only. As similar with other Commonwealth nations, Philippines also requires a continuous 120° minimum in the horizontal meridian.

3.1.2.6 Africa

Many countries in Africa, including Kenya and Nigeria, do not include VF tests as part of their screening for licensure. An exception is South Africa which has clear

regulations that a minimum binocular horizontal field of 115° is required if a monocular VF of 70° temporally is not satisfied.

3.1.3 The method of assessing the visual fields

Most jurisdictions do not give specifications on the method of VF assessment. The Esterman visual field test (EVFT) is acceptable in Australia, UK and Canada. It is a binocular supra-threshold test with one-hundred and twenty points presented in the VF considered to be important for driving which is relatively fast to perform. In Australia, assessment by confrontation is adequate when there is no clinical suggestion of field impairment. If a defect is suspected, monocular automated static perimetry is an acceptable minimum baseline test, but an EVFT is required if there is a large field defect or if a progressive eye condition is present. The Australian guidelines strictly specify that the test must have a false positive score of less than 20 percent to be considered reliable. Some jurisdictions such as the UK and Canada also have guidelines that a white Goldmann III4e target or equivalent should be used. (Tables 4 and 5)

The lack of guidance provided around the specific tests which may be used to determine VF extents is likely reflective of the inconclusive nature of the underlying evidence. Despite acceptance of the EVFT, there is minimal evidence to support it as a valid tool to assess driving safety.

3.1.4 Pattern of visual field loss

Most jurisdictions do not specify a minimum distribution of the VF across the midline. Some states in the USA such as Kentucky, stipulate a minimum of 35° to the left and right of fixation in the horizontal field. Similarly, the EU also requires at least 50° to the left and right of the midline. Furthermore, central scotomas are an exclusion criterion in some jurisdictions. In Australia, New Zealand, Philippines, UK and the EU,

a driver cannot hold a licence if they have any field defect within 20° of fixation above or below the horizontal meridian.

3.1.5 Important visual conditions

A multitude of visual conditions can impact driving and few jurisdictions have clear regulations surrounding their restrictions. In Australia, individuals with diplopia cannot hold an unconditional licence if it affects fixation on objects within the central 20° of the primary direction of gaze. However, they may be permitted to hold a conditional licence if other visual criteria are met and their condition is managed adequately with corrective lenses. Similar restrictions apply in the UK.

Progressive eye conditions such as glaucoma, optic neuropathy, cataract and retinitis pigmentosa have the potential to impair vision over time. The current Australian guidelines stipulate that the sole diagnosis of a progressive eye condition mandates an EVFT to ensure the VF criteria is fulfilled, and regular monitoring of their condition is required to maintain licensure. In addition, although not routinely tested, contrast sensitivity could also be a useful and important adjunct test. This would be relevant for driving in low-lighting environments, particularly for those with cataract or macular degeneration.

After a sudden loss of vision in an eye, a driver may still be able to meet local criteria for driving. In Australia, such drivers cannot drive for a period after the onset of their visual loss and should allow time re-establish stereopsis and adaptation to the condition.

3.1.6 Conditional or restricted licences

Some jurisdictions such as the UK, Australia, New Zealand and some American and Canadian states have conditional licences that allow motorists with progressive or long-term medical conditions to drive with restrictions and periodic review. For

example, Australian drivers can be restricted to driving only in daylight hours, within a certain radius from home or only during off-peak hours.

3.1.7 Bioptic telescope and driving

Bioptic telescopes are not routinely permitted or readily available in Australia, but in some jurisdictions within the USA and Canada, they can be used to meet licensure standards. The device consists of telescopic lens that are mounted to regular spectacle frames. Subjects can selectively bring objects into magnified view whilst driving with small head-dipping movements. Studies demonstrate that bioptic telescopes can meet the needs of drivers with impaired central vision and are helpful aids for driving.³ However, despite their acceptance, there is limited evidence exploring its association with driving performance and MVC risk. Wood et al. conducted a study comparing 23 bioptic drivers with central vision loss with aged-matched controls⁴ and found bioptic drivers displayed poorer steering and lane position control. However, despite these differences, bioptic drivers displayed proficient on-road driving skills as evaluated by two back-seat assessors using a standardised scoring system.

3.2 Comparison and summary of visual standards: commercial licence

3.2.1 Visual acuity

A minimum VA of 6/9 is a common requirement for commercial drivers in Canada, South Africa, Kenya, Nigeria, Australia and New Zealand. Many jurisdictions mandate a lowest uncorrected VA or limit the strength of correction required to obtain the minimum VA to drive.

Similar to private licence guidelines, many countries place restrictions on the minimum VA in a driver's weaker eye. (Table 6) Australian drivers require a BCVA of at least 6/12 for private licensure. This is upgraded to an uncorrected minimum VA

of 6/9 in the better eye and at least 6/18 in the worse eye for a commercial licence. (See Table 6) In the EU, a VA of 6/7.5 in better eye and no worse than 6/60 in the weaker eye is required. This may be with correction, however, the means of correction may be no stronger than 8 dioptres in power.

3.2.2 Visual field

VF standards governing commercial drivers are more stringent compared to private vehicle drivers. In both the UK and EU, private drivers are required to have a minimum of 120° in the horizontal field, compared to 160° for commercial drivers. New Zealand has a common horizontal field requirement of 140° for both private and commercial drivers. (Table 6)

As similar to private licence regulations, there is no unity of the standards world-wide. (See Table 6) The horizontal minimum standard is 160° in the UK, compared to 150° in Canada, 120° in Singapore or, in Hong Kong it is not tested. Some jurisdictions further specify a minimum vertical extent of the field. A minimum of 20° to 30° continuous above and below fixation is a common standard. Some countries such as Australia have identical vertical field standards for both private and commercial vehicle drivers, despite increased horizontal field requirements for the latter group. Other jurisdictions such as EU and UK, have increased standards in both the horizontal and vertical meridians for commercial drivers.

The EVFT is the preferred method of assessment in the UK, Australia and Canada. This is compared to Kenya where having normal VFs as assessed by confrontational methods alone is acceptable.

In the USA, only certified medical examiners listed on an online registry are permitted to perform physical qualification examinations for commercial drivers. Examiners need to complete periodic training and testing to maintain certification.

4. DISCUSSION

4.1 The evidence base

Since the late 1960s significant research has been conducted to determine the impact of visual function on driver safety and performance.

4.1.1 Visual acuity

Despite the large volume of literature available, a definitive consensus has not been reached regarding the impact of VA on driver safety or performance.

4.1.1.2 Visual acuity and driving performance

Schlag and colleagues compared an elderly group of drivers (aged 60-82 years) with a middle-aged group (aged 40-50 years) in a laboratory setting assessing driving.⁵ The authors found the elderly drivers who had decreased VA in comparison to the middle-aged subjects, performed worse. However, the elderly group showed no appreciable decrease in on-road driver performance. Higgins and Wood investigated the impact of simulated cataracts with optical blur in 24 normally-sighted subjects in a closed-road driving assessment study.⁶ The authors found that decreased acuity was associated with decreased sign recognition and hazard perception, but not with poorer driving performance. McGwin and colleagues examined the association between self-reported difficulty with driving tasks and various visual functions.⁷ They found that decreased VA was independently associated with driving difficulty in high-risk situations.

4.1.1.3 Visual acuity and motor vehicle crash risk

Despite the ubiquity of VA assessments in driving licensure, there is a lack of evidence to support it as an accurate predictor of MVC risk.⁸⁻¹⁰ Many studies demonstrate a poor association between low VA and MVC rates.^{8, 10-14} A study by Hills and Burg involving 14000 young and middle-aged drivers found no direct relationship between poor VA and high MVC rates.¹⁴ Similarly, Gresset and Meyer's case-control study with 1400 cases who had a MVC during their 70th year were compared with 2636 controls who were not involved in a MVC.⁸ The authors found that having minimal VA alone, defined as equal to 6/12 or 6/15, did not correlate with a greater risk of MVCs. Likewise, Rubin and colleagues conducted a large epidemiological study examining 1801 drivers and found that poor VA was not associated with MVC rates.¹⁰

Few studies have demonstrated a positive correlation between reduced VA and MVCs.¹⁵⁻¹⁷ For example, a cohort study involving 125 drivers found that those with a VA worse than 20/40 were more likely to have a history of adverse events, but the differences were not statistically significant ($P=0.265$).¹⁷

Confounders in the literature appear to cloud the association between VA and driver safety. There is evidence that those with impaired VA will self-restrict their driving and avoid challenging conditions such as peak hour or night time.^{13,18} Similarly, those individuals who do not meet the VA standards are prohibited from driving, which artificially decreases the MVCs associated with poor VA. Therefore, it is difficult to canvas the true association between these two variables.

4.1.2 Visual field

It is intuitive that an adequate VF is essential for driving, however, defining a 'minimum' field for driving is not straightforward. Many studies have addressed the relationship between VF loss and driving.

4.1.2.1 Visual field and simulation studies

Wood and colleagues conducted a series of experiments exploring the driving performance of elderly drivers on closed-road circuits when their VF was artificially reduced to a horizontal extent of 90°. They found that such simulated VF restrictions were associated with impaired driving performance - with subjects driving more slowly and having longer reaction times.^{19, 20}

Driving simulators have also been used to assess the role of vision in driving. Szlyk and colleagues found a greater proportion of subjects with VF defects due to retinitis pigmentosa (RP) had accidents in a driving simulator.²¹ In another study examining glaucoma patients with mild to moderate VF loss, Szlyk and colleagues found no increase in real-world or simulator accident rates compared to controls.²² However, in a subsequent study, glaucoma patients with a greater degree of VF loss were included, and an increased risk of simulator accidents was observed relative to controls.²³

4.1.2.2 Visual field and motor vehicle crashes

In one of the earliest studies exploring the relationship between VF loss and MVC risk, Johnson and Keltner examined 20,000 eyes.²⁴ They found that drivers with significant binocular field loss had double the rate of MVCs and traffic convictions compared to those without such field loss. Numerous other studies have also reported that VF loss is a risk factor for MVC.^{10, 25-28} In particular, defects of different sub-regions of the field may have varying impacts on MVC rates. In a cohort study

of 1801 drivers, Rubin and colleagues found that lower peripheral field loss was most important for predicting future crash involvement.¹⁰ Similarly, Huisinigh and colleagues' retrospective cohort study of 2000 drivers reported that older drivers with severe impairment in the lower or left region of the driving VF - the field of vision used while driving - were more likely to have a history of at-fault MVC.²⁶ In a subsequent study focusing only on glaucoma patients, Kwon and colleagues reported that VF impairment was independently associated with at-fault MVC involvement.²⁷ More specifically, left VF defects showed the highest risk of MVC (RR = 3.16; P = 0.001). However, as noted by Huisinigh and colleagues, these studies were conducted in the USA, where left VF impairments may increase MVC vulnerability since vehicles are driven on the right side of the road.²⁶ It is yet to be determined whether right VF defects affect MVC rates in countries where vehicles are driven on the left side of the road.

In contrast, some studies do not report a clear association between VF defects alone and increased MVC risk.²⁹⁻³² In a study assessing the driving performance of 42 patients with RP and 87 control subjects, Fishman and colleagues could not find a significant correlation between VF loss and MVC rates.³⁰ In a retrospective cohort study of 12,400 drivers conducted by Decina and colleagues and a case-control study by Owsley and colleagues involving 294 drivers, both authors could not find a link between VF loss and increased crash involvement.^{29, 31} Furthermore, Yuki and colleagues also reported no relationship between central binocular VF damage and MVC rates in a study investigating the association between point-wise VF sensitivities and MVC history in 247 patients with primary open-angle glaucoma.³²

4.2 Important Factors Affecting Driving Ability – Age and Cognition

Driving is a heavily visual task but the ability to see clearly alone is not sufficient. Safe driving requires the ability to visualise objects clearly, recognise hazards, and

react in a timely fashion to unexpected circumstances. Functions which inevitably decline with age such as physical health and cognition, are important to operate a vehicle.

Studies have demonstrated that visual attention and cognitive functions involving the ability to select, search and switch, have a key role in driving risk among older drivers.³³ On-road driving assessments have found that people with dementia or mild cognitive impairment demonstrate poorer driving performance compared to controls and have higher rates of reported MVCs.³⁴⁻³⁷ However, a diagnosis of dementia alone should not result in driving prohibition, as accumulating evidence demonstrates that some people with mild dementia can display adequate driving fitness.^{38, 39} It is with progression of the disease that most patients with dementia will eventually have to cease driving, which is usually within 3 years of diagnosis.⁴⁰

Advancing age also appears to have a negative impact on driving safety. In the USA, Lombardi et al analysed pooled data from a census of fatal traffic crashes from 2011 – 2014.⁴¹ During this time period, 120,809 fatal accidents were reported. After adjusting for age, the authors found the highest annual fatal intersection crash rate per 100,000 licensed drivers was for drivers aged 85 or older. Similarly, a study of 3425 drivers who underwent a formal driving evaluation found that the oldest-old (aged 85 years and older) reported more MVCs compared to the middle-aged (OR = 2.79, 95% CI 1.88 – 4.12) and were more likely to be considered unfit to drive by the official driving evaluation centre.⁴²

Driving is a complex task and vision as an isolated predictor of driving performance or safety is not sufficient. Further research to develop a more predictive model for driving which combines all important factors including cognition and age is needed.

4.3 Importance of individualised assessment

The current literature suggests that severe VF impairments are associated with an increased risk of MVC, however, the impact of mild to moderate field loss is less clear. Studies have shown that individuals with long-standing lesions can develop effective adaptive strategies over time.^{43 - 47} They can compensate for their visual loss through improvements in eye and head movements, scanning in the affected field, and by more frequent saccades towards into the blind side and therefore an expansion of the seeing hemi-field. Results from more and more studies suggest that individual differences in visual compensation exist between drivers.^{48 - 50} Racette and Casson conducted a retrospective study exploring the impact of VF loss on driving performance and found that some patients who did not satisfy VF standards in many jurisdictions, could obtain "safe" driving outcomes when assessed by an occupational therapist.⁴⁹ Similarly, Wood and colleagues also reported that some drivers with hemianopia or quadrantanopia were fit to drive compared with age-matched controls.⁵⁰ In another study investigating the on-road driving performance of patients with glaucoma, Haymes and colleagues found that despite fulfilling local driving licensure vision requirements, some patients with slight VF impairments were 6 times more likely to have a driving instructor intervene for reasons suggesting difficulty detecting peripheral obstacles and hazards.⁵¹ Variability of VF loss compensation exists between individuals.

Furthermore, it is also important to consider that standard automated perimetry (SAP) may not be a reliable tool to assess the impact of peripheral VF loss on driving ability. As a static white-on-white test performed in a controlled environment, SAP does not accurately reflect the demands that a complex task such as driving imposes on vision. Driving requires detection of stimuli in cluttered environments, division of attention and simultaneous use of both peripheral and central vision. Mounting evidence demonstrates that tests of the functional field of view may be more reliable

predictors of MVC risk. This includes the useful field of vision (UFOV) test which assesses the total VF area in which useful information can be acquired without eye and head movements.⁵² Since its introduction, the UFOV test has been shown to be strongly associated with crash involvement.^{11, 53} Owsley and colleagues found in a case-control study that drivers involved in non-injurious crashes were 5.5 times more likely to have a substantial UFOV impairment,³¹ while Rubin and colleagues reported that drivers with a reduced extent of the UFOV were 2.12 times more likely to crash than those with no loss of UFOV.¹⁰ Further, Wood and colleagues found that the selective attention subtest of the UFOV had the strongest predictive value of overall driving performance as assessed in a closed-road circuit in the presence of distracters.⁵⁴ However, the UFOV is not readily available in Australia and often only used as an additional test for some patients.

In practice, the ability to predict individual risk is particularly important in the context of driving licensure. The decision to revoke an individual's licence needs to be well-justified. Current evidence from population-based studies suggest an increased-odds of MVC in those with significant VF loss, and UFOV tests appear to be an accurate predictor of MVC risk.^{10, 24} However, individual risk prediction cannot be determined through findings from general epidemiological studies. Gracitelli and colleagues conducted a small prospective observational cohort study addressing this issue involving 117 drivers with glaucoma.⁵⁵ The authors found that longitudinal divided attention metrics on the UFOV were significantly predictive of individual risk of MVC. Further prospective studies evaluating the prediction of individual risk with larger sample sizes are warranted.

The evidence suggests individual differences are important to account for in the assessment of driving fitness. This raises questions about the fairness of current regulations which may categorically deny licensure to those with particular field

defects. The unique way in which each individual can compensate for their visual loss while driving is important to consider. In addition, vision is necessary but not sufficient for safe driving. The consideration of factors including cognition and age are also important. This is especially relevant when considering driving licensure, where our ability to predict future individual risk is of primary importance.

4.4 Concluding Remarks

Across the world, policy surrounding driving regulations inevitably presents an inherent challenge as the intrinsic desire for individual autonomy and independence is pitted against the need for community safety and risk minimisation. This study is the first large scale review of the basic screening visual requirements for driving across the world. It highlights a lack of unity in the standard for VA and VF for both private and commercial vehicles. Such disunity likely reflects the inconclusive nature of the underlying evidence, as well as the different socioeconomic conditions of different countries. Moreover, with little guiding evidence, a value judgement upon the relative priorities of individual autonomy and public safety needs to be made. Such judgements are likely to be influenced by local factors affecting each jurisdiction, and further account for the disunity observed. Further research is warranted to identify the role of an internationally-consistent minimum visual standard, and also evaluate the role of individualised assessments and risk prediction in driver licensing.

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TABLES

Table 1: Sources of information – jurisdictions worldwide

Country	Citation
Australia	Austroads. Assessing Fitness to Drive: for commercial and private vehicle drivers. Austroads Ltd; 2016. P 125
New Zealand	New Zealand Transport Agency. Medical aspects of fitness to drive. [Internet]. July 2014. [cited 18th September 2018]. Available from: https://nzta.govt.nz/resources/medical-aspects/6.html#62
Papua New Guinea	Independent State of Papua New Guinea: Motor Traffic Regulation 1967. [Internet]. 2006. [cited September 2018]. Available from www.pacii.org/pg/legis/consol_act/mtr1967244.rtf
United Kingdom	Driver and License Vehicle Agency. Visual disorders: assessing fitness to drive. [Internet]. August 2018 [cited September 2018]. Available from: https://www.gov.uk/guidance/visual-disorders-assessing-fitness-to-drive#minimum-eyesight-standards--all-drivers
European Union	European Council of Optometry and Optics. Visual standards for driving in Europe - a consensus paper. 2017. P 4
Hong Kong	Transport department of the government of Hong Kong. Guide to Private/Public Light Bus and Private/Public Bus Driving Test. [Internet]. March 2017. [cited September 2018]. Available from: https://www.td.gov.hk/filemanager/en/publication/guide%20to%20driving%20test%20plb%20&%20bus%20(english%20version)_june%202015_with%20rev%20notice.pdf
PRC	Provisions on the application for and use of motor vehicle driving licenses. [Internet]. January 2016. [cited September 2018]. Order of the Ministry of Public Security No. 139. Available from http://hk.lexiscn.com/law/provisions-on-the-application-for-and-use-of-motor-vehicle-driving-licenses-revised-in-2016.html

Taiwan	Kaohsiung City Motor Vehicles Office. Driving License Test. [Internet]. November 2012 [cited September 2018]. Available from: https://khcmv.thb.gov.tw/English/QandA/QA02.htm
Japan	Kunimatsu-Sanuki S, Iwase A, Araie M, <i>et al</i> An assessment of driving fitness in patients with visual impairment to understand the elevated risk of motor vehicle accidents <i>BMJ Open</i> 2015; 5 :e006379. doi:10.1136/bmjopen-2014-006379
Singapore	Singapore Medical Association. Medical Guidelines on Fitness to Drive. Singapore Medical Association. [Internet]. 2011. [cited September 2018]. Available from https://www.sma.org.sg/publications/
Malaysia	Haliza A, Md Muziman Syah M, Norliza M. Visual Problems of New Malaysian Drivers. <i>Malaysian Family Physician : the Official Journal of the Academy of Family Physicians of Malaysia</i> . 2010;5(2):95-98.
Philippines	Public Attorneys Office. Vision Requirements for Driving. [Internet] [no date]. [cited September 2018]. Available from: http://www.pao.org.ph/PDF/circulars/PAO_POLICY_STATEMENT_Vision_%20Requirements_for_Driving.pdf
India	Koshy, J. Indian drivers blind behind the wheel? [Internet]. India. The Hindu. September 2016. [cited September 2018]. Available from https://www.thehindu.com/opinion/op-ed/Indian-drivers-blind-behind-the-wheel/article14228612.ece
Sri Lanka	College of Ophthalmologists Sri Lanka. Vision standard for driving license in Sri Lanka. [Internet]. [no date] [cited September 2018]. Available from: http://www.cosl.lk/pdf/Vision_standards_Driving_license_Sri_Lanka.pdf
Colombia	Republic of Colombia. Ministry of Transport. Official Gazette No. 48657 of December 28, 2012. Colombia. Pp 12 - 13
United States of America	See Table 2
Canada	Canadian Medical Association. Determining medical fitness to operate motor vehicles. Toronto: Joule Inc. 2017. Pp 63 - 68
South Africa	National Road Traffic Act 93 of 1996 – Amendment Act 20 of 2003. [Internet]. Pretoria: Department of

Transport. 2003 [cited September 2018]. Available from: <http://www.oasa.org.za/Regulation102.php>

Kenya	Gichangi MM, Gathecha GK, Kibogong D. Vision testing to prevent road traffic accidents in Kenya. <i>Community Eye Health</i> . 2015;28(91):S04-S06.
Nigeria	National Road Traffic Regulations. 79. Lagos Nigeria: The Federal Government press; 2004. pp. B 173–B 303.

Table 2: Sources of information - United States of America

Jurisdiction	Source
Alabama	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Alaska	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Arizona	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Arkansas	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
California	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Colorado	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Connecticut	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=

Delaware	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
District of Columbia	Department of Motor Vehicles. District of Columbia. [Internet]. [no date]. Available from https://dmv.dc.gov/service/screening-vision
Florida	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Georgia	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Hawaii	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Idaho	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Illinois	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Indiana	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=

Iowa	Iowa Department of Transport. Driver's License/ID. [Internet]. [no date]. [cited September 2018]. Available from https://iowadot.gov/mvd/driverslicense/fees-and-license-type
Kansas	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionreqs&orderby=abbv&sortorder=&country=
Kentucky	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionreqs&orderby=abbv&sortorder=&country=
Louisiana	Eye Specialists of Louisiana. Louisiana Driver's License Vision Requirements. [Internet]. 2013. [cited September 2018]. Available from https://www.eyespecialistsofla.com/blog/bid/266260/louisiana-driver-s-license-vision-requirements
Maine	Bureau of Motor Vehicles - State of Maine. Visual Disorders. [Internet]. [no date]. [cited September 2018]. Available from https://www.maine.gov/sos/bmv/licenses/VISUAL%20DISORDERS.pdf
Maryland	Maryland Department of Transportation. Motor Vehicle Administration - Vision Requirements. [Internet]. [no date]. [cited September 2018]. Available from http://www.mva.maryland.gov/drivers/vision-requirements/
Massachusetts	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionreqs&orderby=abbv&sortorder=&country=
Michigan	Department of State - Michigan. Visual Standards for Motor Vehicle Drivers' Licenses. [Internet]. [no date]. [cited September 2018]. Available from https://www.michigan.gov/documents/Vision_Standards_19484_7.pdf
Minnesota	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionreqs&orderby=abbv&sortorder=&country=
Mississippi	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from:

	http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Missouri	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Montana	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Nebraska	Department of Motor Vehicles. Nebraska Department of Motor Vehicles - Chapter 7. [Internet]. [no date]. [cited September 2018]. Available from http://www.sos.ne.gov/rules-and-regs/regsearch/Rules/Motor_Vehicles_Dept_of/Title-247/Chapter-7.pdf
Nevada	Department of Motor Vehicles - Official Website of the State of Nevada. [Internet]. 2018. [cited September 2018]. Available from http://www.dmvnv.com/dltesting.htm
New Hampshire	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
New Jersey	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
New Mexico	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
New York	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=

North Carolina	North Carolina Society of Eye Physicians and Surgeons. Vision Requirements for Driving Safety. [Internet]. [no date] [cited September 2018]. Available from http://www.nceyemd.org/pages/patient_info.html
North Dakota	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Ohio	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Oklahoma	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Oregon	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Pennsylvania	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Rhode Island	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
South Carolina	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
South Dakota	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from:

	http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Tennessee	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Texas	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Utah	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Vermont	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Virginia	Virginia Department of Motor Vehicles. DMV Visual Field Policy. [Internet]. 2017. [cited September 2018]. https://www.dmv.virginia.gov/drivers/#medical/visualfield.asp
Washington	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
West Virginia	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from: http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=
Wisconsin	Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from:

<http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=>

Wyoming

Foundation for Traffic Safety. Driver Licensing Policies and Practices. [Internet]. 2016. [cited September 2018]. Available from:

<http://lpp.seniordrivers.org/index.cfm?selection=visionregs&orderby=abbv&sortorder=&country=>

Table 3: Search strategy by continent for visual field standard

Continent Name	Details of Search
Australia and Oceania	Australia: Search performed. Results available and included in review. Individual states not searched separately. New Zealand: Search performed. Results available and included in review. Papua New Guinea: Search performed. Results available and included in review. Fiji, Solomon Islands, Micronesia, Vanuatu: Search performed. No relevant results were found. Samoa, Kiribati, Tonga, Marshall Islands, Palau, Tuvalu and Nauru: Not searched.
Europe	Search performed. Results available for European Union and included in review. Individual countries were not searched separately. United Kingdom: Search performed. Results available and included in review.
Asia	People's Republic of China: Search performed. Results available and included in review. Hong Kong: Search performed. Results available and included in review Taiwan: Search performed. Results available and included in review Japan: Search performed. Results available and included in review Singapore: Search performed. Results available and included in review Malaysia: Search performed. Results available and included in review Philippines: Search performed. Results available and included in review India: Search performed. Results available and included in review

	Sri Lanka: Search performed. Results available and included in review Indonesia, Thailand, South Korea, Afghanistan, Pakistan, Bangladesh, Vietnam: Search performed. No relevant results were found. Turkey, Iran, Myanmar, Iraq, Saudi Arabia, Uzbekistan, Nepal, Yemen, North Korea, Kazakhstan, Syria, Cambodia, Jordan, Azerbaijan, United Arab Emirates, Tajikistan, Israel, Laos, Kyrgyzstan, Lebanon, Turkmenistan, State of Palestine, Oman, Kuwait, Georgia, Mongolia, Armenia, Qatar, Bahrain, Timor-Leste, Cyprus, Bhutan, Maldives, Brunei: : Not searched.
North America	Search performed. Results available and included in review. Individual states searched.
South America	Colombia: Search performed. Results available and included in review. Brazil, Argentina, Peru, Venezuela, Chile, Ecuador, Bolivia, Paraguay, Uruguay, Guyana, Suriname: Search performed. No relevant results were found.
Africa	Search performed using "Africa" combined with each of "driving", "minimum", "visual acuity", "visual field" and results were available for Kenya, Nigeria and South Africa. References of journal articles attained were also reviewed. Individual searches for each country was not performed.
Antarctica	Search performed. No relevant results were found.

Table 4: Summary of basic minimum visual standards world-wide for private driving licence

Jurisdiction	Visual Acuity Requirement	Visual Field Requirement
COMMONWEALTH NATIONS		
Australia	A person is not fit to hold an unconditional licence if the uncorrected VA [†] in the better eye or with both eyes together is worse than 6/12	Binocular visual field horizontal extent at least 110° with 10° above and below horizontal midline; or Cannot hold if any scotoma within a central radius of 20° of the foveal fixation or other scotoma likely to impede driving performance
New Zealand	Minimum combined VA of 6/12 – with or without correcting lenses	Minimum standard is a binocular horizontal field of 140° and should be no significant pathological field defect encroaching within 20° of the point of fixation

Papua New Guinea	The minimum standard vision required is that if one eye is less than 6/60 vision or sightless– (i) the other can be corrected by glasses to 6/12; or (ii) each eye can be corrected by glasses to 6/18.	Not Specified
United Kingdom	The minimum eyesight standard is a VA of at least 0.5 (6/12) measured on the Snellen scale (with glasses or contact lenses, if necessary) using both eyes together or, if you have sight in one eye only, in that eye	The minimum field of vision for safe driving is defined as: 'A field of at least 120° on the horizontal measured using a target equivalent to the white Goldmann III4e settings. The extension should be at least 50° left and right. In addition, there should be no significant defect in the binocular field which encroaches within 20° of fixation above or below the horizontal meridian.' If a visual field assessment is necessary to determine fitness to drive, DVLA [†] requires this to be a binocular Esterman visual field test
EUROPE		
European Union	Binocular VA, with corrective lenses if necessary, of at least 6/12 when using both eyes together	Horizontal visual field at least 120°; extension should be at least 50° left and right; 20° up and down No defects should be present within a radius of the central 20°
ASIA		
People's Republic of	Naked vision or corrected vision of both eyes of that of an applicant applying for a motor vehicle driver's	Not Tested

China (PRC)	license for other permitted types of vehicles shall be 4.9 or above in the logarithmic vision chart	
Hong Kong	Read motor vehicle registration mark at distance of 23 meters in good daylight – with or without corrective lenses	Not Tested
Taiwan	On a bare eyesight examination, two eyes' eyesight reaches over 0.6; each one reaches over 0.5. Or, after correction, two eyes' eyesight reaches over 0.8; each one reaches over 0.6	Left and right eye can view a range of 150°
Japan	Binocular VA 20/30; or monocular VA 20/30	A minimum horizontal visual field of 150° is required on a modified Förster perimeter in monocular drivers
Singapore	At least 6/12 in one eye; if worse eye has VA less than 6/36, or if the person has monocular vision, his horizontal field of vision should be tested	Only tested if monocular VA less than 6/36 in the worse eye is a horizontal field of at least 120° required
Malaysia	Minimum Snellen 6/60 in each eye without glasses; Snellen 6/12 in the best eye with corrective glasses	Not Tested
Philippines	Distant binocular VA not less than 20/40 by Snellen (or 0.5, 6/12) in both eyes, with or without corrective lenses	Uninterrupted visual field of 120° or better along the horizontal meridian and 20° or better, above and below fixation, with both eyes open and examined together
India	VA 6/18 or better	Not Tested
Sri Lanka	VA 6/12 in each eye with or without glasses; should wear corrective lenses when driving	140° in the horizontal meridian. Defect in one eye should be completely compensated by the other eye
SOUTH		

AMERICA

Colombia	A minimum VA 20/30 binocular	Should have minimum horizontal binocular extent of 120° and minimum vertical extent of 70°
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NORTH AMERICA

United States of America	See Table 5	
Canada	VA at least 20/50 (6/15), with both eyes open & examined together with or without aid of corrective lenses	Horizontal visual field of at least 120° continuous along the horizontal meridian and at least 15° continuous above and below fixation, with both eyes open and examined together

AFRICA

South Africa	According to the Snellen rating a minimum VA, with or without refractive correction, of 6/12 (20/40) for each eye, or where the VA of one eye is less than 6/12 (20/40) or where one eye of the person concerned is blind, a minimum VA for the other eye of 6/9 (20/30)	A minimum visual field of 70° temporal, with or without refractive correction, in respect of each eye, or where the minimum visual field in respect of one eye is less than 70° temporal, or where one eye is blind, a minimum total horizontal visual field of at least 115° with or without refractive corrector
Kenya	Not tested	Not tested
Nigeria	At least 6/12 in the better eye and 6/36 in the poorer eye	Not tested

[†]VA: Visual Acuity, [‡]DVLA: Driver and Vehicle Licensing Agency

Table 5: Summary of basic minimum visual standards for private driving licence in the United States of America

Jurisdiction	Visual Acuity Requirement	Visual Field Requirement
Alabama	Both eyes with/without correction 20/40	110° horizontal, 80 vertical (binocular)
Alaska	Both eyes with/without correction 20/40	None
Arizona	Both eyes with/without correction 20/40	70° temporal, 35° nasal, monocular in at least one eye
Arkansas	Both eyes with/without correction 20/40	At least 140° in two eyes, or at least 105° in one eye
California	Both eyes with/without correction 20/40	None
Colorado	Both eyes with/without correction 20/40	55° temporal in both eyes and on eye at least 35° nasal
Connecticut	Both eyes with/without correction 20/40	A binocular field of 140° in horizontal meridian, or monocular field of 100° in horizontal meridian
Delaware	Both eyes with/without correction 20/40	None
District of Columbia	No less than 20/40 in the best eye; or no less than 20/70 in the best eye	Field of vision at least 140°
Florida	Minimum of 20/40 vision in each eye with or without correction is required, otherwise referral to ophthalmologist for further assessment	130° horizontal binocular
Georgia	20/60 or better, corrected or uncorrected in at least one eye	140° with both eyes open; monocular drivers minimum of 70° temporal 50° nasal
Hawaii	Both eyes with/without correction 20/40	140° binocular, 70° monocular
Idaho	Both eyes with/without correction 20/40	None
Illinois	Both eyes with/without correction 20/40	140° binocular; 105° monocular (70° temporal, 35°

Indiana	20/40 in the better eye with or without correction	nasal) 120° binocular; 70° monocular
Iowa	20/40 in one or both eyes	140° binocular
Kansas	Both eyes with/without correction 20/40	110° binocular; 55° monocular
Kentucky	At least 20/60 or better in at least one eye	Horizontal field of vision at least 35° to the left and right of fixation and vertical field of vision at least 25° above and below fixation
Louisiana	At least 20/40 in the dominant eye	None
Maine	Both eyes with/without correction 20/40	A minimum visual field of 120° horizontal with minimum of 50° to left and 50° to right of fixation
Maryland	At least 20/40 in each eye	A continuous field of 140° binocular
Massachusetts	Both eyes with/without correction 20/40	A 120° minimum in the horizontal field
Michigan	Both eyes with/without correction 20/40	140° minimum binocular
Minnesota	Both eyes with/without correction 20/40	105° minimum binocular
Mississippi	Both eyes with/without correction 20/40	150° binocular; 70° temporal 35° nasal monocular
Missouri	Both eyes with/without correction 20/40	55° or better in both eyes; or 85° in a monocular driver
Montana	Both eyes with/without correction 20/40	None; Only for commercial drivers
Nebraska	Both eyes with/without correction 20/40	140° or greater
Nevada	Both eyes with/without correction 20/40	None
New Hampshire	20/40 (20/30 if one eye)	None
New Jersey	Both eyes with/without correction 20/50	None
New Mexico	20/40 or better in at least one eye, with or without glasses	A visual field of 120° in the horizontal meridian, with at least 30° in the nasal field of one eye
New York	Both eyes with/without correction 20/40	140° binocular field of vision

North Carolina	Both eyes with/without correction 20/40	A visual field of 60° in one eye, or 30° on each side of the central point of fixation
North Dakota	Both eyes with/without correction 20/40	Horizontal visual field of 105° degrees or better, binocular or monocular
Ohio	Both eyes with/without correction 20/40 or better	Minimum 70° temporal in each eye
Oklahoma	20/60 or better with/without correction, or 20/50 or better in one eye	At least 70° horizontal meridian in one eye alone or with both eyes
Oregon	VA of 20/70 or better when looking through both eyes	A field of vision at least 110° binocular or monocular
Pennsylvania	Both eyes with/without correction 20/40	A combined field of vision at least 120° in the horizontal meridian
Rhode Island	Both eyes with/without correction 20/40	A minimum of 115° in the horizontal meridians in binocular drivers; minimum of 40° nasally and 75° temporally in monocular drivers
South Carolina	Each eye by itself most score 20/40 or better with or without glasses	Field of vision of at least 70° in the horizontal meridian in each eye
South Dakota	Both eyes with/without correction 20/40	None
Tennessee	Both eyes with/without correction 20/40	For professional drivers only
Texas	Without corrective lenses, 20/40 or better each eye and both together; with corrective lenses, 20/50 or better with best eye or both together	None
Utah	Both eyes with/without correction 20/40	A minimum of 120° in horizontal meridian; with 60° to both right and left)
Vermont	Both eyes with/without correction 20/40	Both eyes, 60° or more external each eye; One eye,

Virginia	Both eyes with/without correction 20/40	60° or more external, 60 or more nasal.
Washington	Both eyes with/without correction 20/40	110° or better, horizontal vision in one or both eyes
West Virginia	Both eyes with/without correction 20/40	110° in the horizontal meridian
Wisconsin	Both eyes with/without correction 20/40	None
Wyoming	Both eyes with/without correction 20/40	A minimum of 70° field of vision
		A total combined horizontal field of vision with both eyes at least 120°

Table 6: Summary of basic minimum visual standards world-wide for commercial driving licence

Jurisdiction	Visual Acuity Requirement	Visual Field Requirement
COMMONWEALTH NATIONS		
Australia	A person is not fit to hold an unconditional licence if the uncorrected VA [†] is worse than 6/9 in the better eye; or if the uncorrected VA is worse than 6/18 in either eye	Not fit for licence if person has any visual field defect Conditional licence may be granted if can meet: binocular visual field has an extent of at least 140° within 10° above and below the horizontal midline. No significant field loss/scotoma, hemianopia, quadrantanopia likely to impede driving
New Zealand	Minimum combined VA of 6/9	Minimum standard is a binocular horizontal field of 140° and should be no significant pathological field defect encroaching within 20° of the point of fixation
United Kingdom	You must have a VA at least 0.8 (6/7.5) measured on the Snellen scale in your best eye and at least 0.1 (6/60) on the Snellen scale in the other eye. You can reach this standard using glasses with a corrective power not more than (+) 8 dioptries, or with contact lenses. There's no specific limit for the corrective power of contact lenses.	You must have a horizontal visual field of at least 160°, the extension should be at least 70° left and right and 30° up and down. No defects should be present within a radius of the central 30°
EUROPE		

European Union	VA, 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 VA (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°, the extension should be at least 70° left and right and 30° up and down. No defects should be present within a radius of the central 30°
ASIA		
People's Republic of China (PRC)	The naked vision or corrected vision of both eyes of an applicant applying for a motor vehicle driver's license for large passenger buses, towing vehicles, urban buses, medium-sized passenger buses, large trucks, trolley buses or trams shall be 5.0 or above in the logarithmic vision chart	Not tested
Hong Kong	Ability to read motor vehicle registration mark at distance of 23m in good daylight (with aid of spectacles or other corrective lenses, if worn)	Not tested
Singapore Malaysia	Should have VA at least 6/12 in each eye VA of at least 6/12 in each eye with or without corrective aids such as glasses or contact lenses	Not tested A binocular visual field at least 120° along the horizontal meridian and 20° above and below the horizontal midline
India	6/18 or better	Not tested

Sri Lanka	6/9, 6/12 or vice versa with or without glasses; should wear corrective lenses when driving; An uncorrected minimum vision in the worse eye – 6/60	140° in the horizontal meridian; no defect within 20° from fixation horizontally or vertically
NORTH AMERICA		
United States of America	VA at least 20/40 in each eye with or without correction. The use of corrective lenses should be noted on the Medical Examiner's Certificate.	At least 70° field of vision in horizontal meridian measured in each eye
Canada	At least 20/30 (6/9) with both eyes open and examined together and not poorer than 20/400 in the weaker eye, with or without aid of corrective lenses	Horizontal visual field of at least 150° continuously along the horizontal meridian and at least 20° continuously above and below fixation, with both eyes open and examined together
AFRICA		
South Africa	According to the Snellen rating a minimum VA, with or without refractive correction, of 6/9 (20/30) for each eye;	A minimum visual field of 70° temporal in respect of each eye, with or without refractive correction
Kenya	At least 6/9 in best eye; at least 6/60 in other eye	Normal visual fields Using standard methods, but at least by confrontation method
Nigeria	At least 6/9 in better eye and 6/24 in the poorer eye with or without glasses	Optec 1000 test (free and mandatory for commercial drivers)

[†]VA: Visual Acuity

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