Expert Panel Recommendations

Vision and Commercial Motor Vehicle Driver Safety

Medical Expert Panel Members

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Introduction

The primary mission of the U.S. Department of Transportation's (DOT's) Federal Motor Carrier Safety Administration (FMCSA) is to reduce crashes, injuries and fatalities involving commercial motor vehicles, or CMV's, (including large trucks and buses) in the United States of America. One mechanism by which the FMCSA aims to meet this commitment is to ensure that individuals who drive CMV's are physically qualified to do so. While physical qualification standards do exist and all CMV drivers must be certified by a qualified medical examiner as meeting these standards on a biennial basis, the standards have been criticized as being potentially outdated. In addition, a number of disorders exist that are not addressed by the current standards. As a consequence, the FMCSA has embarked on a program whereby it will review all of its current physical qualification standards and begin the process of updating them as necessary by 2009.

At the present time the FMCSA has physical qualification standards directly pertaining to individuals with visual disorders. These qualifications are found in Appendix A of this document. The FMCSA determined that it was necessary to re-examine whether visual disorders were likely to have a deleterious impact on driver safety and, if it does, to determine how this might best be mitigated. Consequently, the FMCSA requested that Manila Consulting and its research team summarize the best available evidence on the impact that visual disorders may have on driver safety. In addition, the agency asked Manila Consulting to convene an expert panel to provide recommendations to the agency as to whether and, under what conditions, individuals with visual disorders may be considered physically qualified to drive a CMV.

This report serves the purpose of summarizing the considerations and recommendations of a panel of three experts from the field of vision and visual disorders (henceforth termed the Medical Expert Panel, or MEP) who examined the FMCSA's current guidelines for medical examiners pertaining to visual disorders.

Scope of Recommendations Document

The impact on CMV safety of a number of visual disorders were considered by the MEP. These disorders included the following:

- Monocular vision
- Red-green color deficiencies (protan or deutan)
- Visual field loss
- Cataracts
- Diplopia

Composition of the Medical Expert Panel

Members of the MEP charged with making recommendations to the FMCSA on their view as to whether current physical qualifications standards and guidelines to medical examiners pertaining to vision require updating are listed in Table 1.

Table 1. Members of MEP

Name	Current Position
Dr. Frank Berson, MD	Chief of Division of Ophthalmology at Beth Israel Deaconess Medical Center in Boston. He is a member of Harvard Medical Faculty Physicians at Beth Israel Deaconess Medical Center and Associate Professor of Ophthalmology at Harvard Medical School. He specializes in Ophthalmology and his areas of interests are glaucoma and cataract. Dr. Berson received his MD from Harvard Medical School and completed his internship in surgery at Beth Israel Hospital. Dr. Berson completed his residency and fellowships at the Massachusetts Eye and Ear Infirmary, where he also served as Program Director and Associate Chief of Ophthalmology. He is board certified by the American Board of Ophthalmology
Dr. Cynthia Owsley, MSPH, PhD	Professor of Ophthalmology and holder of the Nathan E. Miles Chair of Ophthalmology at the School of Medicine at the University of Alabama at Birmingham (UAB), she is Director of the Clinical Research Unit in the Department of Ophthalmology, and also serves as Co-Director of the Center for Research on Applied Gerontology at UAB. She received her B.A. degree from Wheaton College in Massachusetts, and went on to receive a Ph.D. from Cornell University in Psychology, concentrating in the area of perceptual development. Following graduate school, Dr. Owsley did post-doctoral training in vision and aging at Northwestern University and also in epidemiology at the University of Alabama at Birmingham where she received an M.S.P.H. Dr. Owsley has directed several projects on aging-related vision impairment, eye disease, and their impact on everyday life. She served both as a member and as the Chair of the Planning Panel on Vision Impairment and Rehabilitation for the National Eye Institute's National Plan. She is a past member of the Editorial Boards of Vision Research and a current editorial board member for Current Eye Research, and is a Fellow of the American Psychological Association and the Gerontological Society of America. Dr. Owsley is also the recipient of the Glenn A. Fry Award and the Bartimaeus Award from the Detroit Institute of Ophthalmology, and is Senior Scientific Investigator for Research to Prevent Blindness, Inc. For the National Research Council, Dr. Owsley was previously a member of the Committee on Vision and Committee on Disability Determination for Individuals with Visual Impairments, and is currently Chairperson of the Committee for Safe Mobility of Older Persons of the Transportation Research Board. She is a consulting member of the Food and Drug Administration's Panel on Ophthalmic Devices and a recent member of the External Advisory Committee of the Claude D. Pepper Older Americans Independence Center at UCLA.
Dr. Eli Peli, M.Sc., O.D.	Senior Scientist and the Moakley Scholar in Aging Eye Research at Schepens Eye Research Institute, and Professor of Ophthalmology at Harvard Medical School. He serves on the faculty of the New England College of Optometry (Adjunct Professor of Optometry and Visual Sciences). He holds a Masters of Science in Electrical Engineering from Technion-Israel Institute of Technology and an Optometry degree from New England College of Optometry. Since 1983 he has been the direc of the Vision Rehabilitation Service at the New England Medical Center Hospitals in Boston. Dr. Peli is a Fellow of the Americ Academy of Optometry, the Optical Society of America, the Society for Information Display, and of the International Society of Optical Engineering. He was recipient of the 2001 Glenn A. Fry Lecture Award, the 2004 Alfred W. Bressler Prize in Vision Science (shared with Dr. R. Massof), and the 2006 Pisart Vision Award. He was also awarded an Honorary Degree of Master Medicine by Harvard Medical School in 2002 and an Honorary Doctor of Science Degreefrom the State University of New Yor 2006. Dr. Peli's principal research interests are image processing in relation to visual function and clinical psychophysics in low-visio rehabilitation, image understanding and evaluation of display-vision interaction, as well as oculomotor control and binocular vision. Dr. Peli is a consultant to many companies in the ophthalmic instrumentation area and to manufacturers of head mour displays. He serves as a consultant on many national committees, advising the National Institutes of Health and NASA Aviatio Operations Systems advisory committee. Dr. Peli has published more than 120 scientific papers and has been awarded 8 US Patents. He also edited a book entitled *Visual Models for Target Detection* with special emphasis on military applications and coauthored a book entitled *Driving with Confidence: A Practical Guide to Driving with Low Vision*.

Methodology

Brief Overview of Evidence Report Methodology

The recommendations of the MEP presented in this report were informed in part on the interpretation and assimilation of information presented in a comprehensive evidence report summarizing the best evidence that is currently available in the literature. This evidence report titled, "Vision and Commercial Motor Vehicle Driver Safety," was developed following a systematic search for evidence accessible through several electronic databases. The electronic databases included (but were not limited to) Medline, PubMed (pre Medline), EMBASE, PsycINFO, CINAHL, and the Cochrane Library (through December 3, 2007). All searches were supplemented by hand searches of the published literature (e.g. bibliographies of identified relevant articles) and "gray literature" resources (e.g., Web searches).

The MEP Meeting and Recommendation Formulation

On January 23, 2008, the FMCSA, Manila Consulting, the ECRI Institute, and the three members of the MEP convened a one-day conference. The goals of this meeting included the following:

- To review the existing FMCSA standards and guidelines for medical examiners on the certification and recertification of individuals who have, or are suspected of having, visual disorders.
- To discuss the available evidence in the evidence report and other sources on the consequences to public safety of certifying individuals with visual disorders medically fit to drive a CMV.
- To recommend changes to existing FMCSA standards and guidelines deemed necessary following the critical assessment of the available evidence.

In developing their recommendations to the FMCSA, members of the MEP were guided by three central principles. These are:

- Recommendations pertaining to physical qualification standards (or guidance to medical examiners) should be based on scientific evidence whenever possible[1].
- Recommendations pertaining to physical qualification standards (or guidance to medical examiners) should be concise and explicit.
- Recommendations pertaining to physical qualification standards (or guidance to medical examiners) should be actionable.

This document summarizes the recommendations derived from this process.

[1]Recommendations from the Medical Expert Panel, for which no supporting evidence was identified and which are thus based on expert opinion alone, are identified as such.

MEP Commentary on Findings of Evidence Report

While the MEP agreed with the findings of FMCSA's draft Evidence Report titled, "Visual Disorders and Commercial Motor Vehicle Driver Safety," they disagreed with the reasoning for including and excluding a number of studies. The research team took the panels criticism into consideration and agreed that the report should be amended before it was finalized. This task has been completed and the executive summary of the final evidence report is presented in Appendix A. It should be noted that the amendments to the evidence report had no impact on the findings of the draft report; however, the changes did have an impact on the strength of evidence assigned to some conclusions.

Recommendations to the FMCSA from the MEP

The MEP believes that some individuals with visual disorders do constitute an additional risk to road safety. In light of the available scientific data, the MEP made several specific recommendations to the FMCSA. These recommendations are presented below.

Recommendation 1: Monocular Vision and Crash Risk

The MEP opined that the current standard which precludes individuals with monocular vision from driving a CMV for the purposes of interstate commerce cannot be changed at this time (see Appendix B).

Justification

The members of the MEP agreed that the current evidence is not sufficient to justify a change in this standard. The evidence report did not rule out the possibility of increased crash risk for monocular drivers. Although data from the Vision Exemption Program suggest fewer reported crashes after acceptance into the program than control drivers, panel members were concerned about how the control group was established and why the crash frequency of controls appeared higher than expected. Members of the panel thought that the Exemption Program should be continued and a protocol established to obtain the data necessary for a future recommendation. The estimate for the minimum time required for additional data is two years.

Recommendation 2: Red-Green Color Deficiencies (protan or deutan) and Crash Risk

The MEP opined that the standard cannot be changed at this time.

- Revisions in testing guidelines should be considered with regard to specific tests

Justification

Currently available evidence is insufficient to determine whether red-green color deficiencies increase crash risk. However, at this time this possibility cannot be ruled out. Consequently, the panel did not deem it appropriate to either eliminate or modify the relevant part of the current physical qualifications standard.

Recommendation 3: Visual Field Loss and Crash Risk

The MEP opined that the standard should be restated and the minimal field possibly modified.

- The current standard of 70 degrees *may be* adequate
    - Whether this needs a modification, and what that modification should be, has yet to be determined.
- The method(s) of visual field testing should be clarified.
- The confrontational test may be considered acceptable except in situations where the examinee has a history of visual disorders.
    - If the examinee has a history of visual disorders such as glaucoma, another test must be used to determine visual field loss.
    - If the examinee fails the confrontational test, another test must be used to determine visual field loss.
    - Which test to determine visual field loss for individuals who fail the confrontational test or have a history of visual disorders has not been determined by the MEP.

Justification

The members of the MEP agreed that the current evidence is not sufficient and more information is needed to guide a recommendation for this standard. It is clear from the evidence report that visual field loss is associated with an increased risk of crash. Furthermore, the current field standard of 70 degrees horizontal for each eye, established in 1971, appeared to be an incorrect restatement of the previous 140 degree binocular requirement expressed in monocular terms. Two previous panels have recommended restatement of the standard as 120 degrees but this should be considered arbitrary without sufficient evidence for support.

Recommendation 4: Cataracts and Crash Risk

The members of the MEP opined that there is insufficient evidence to modify the standard to include the possible impact of cataract on CMV driving eligibility.

Justification

The evidence is insufficient to determine whether cataract (especially for cataract that affect VA less than the limit required by the current VA standard of 20/40) increases crash risk, although the possibility cannot be ruled out. There was agreement that disabling glare and loss of contrast sensitivity were important factors to be considered in any evidence base. The MEP noted that cataract is now usually treated surgically with a high success rate.

Recommendation 5: Diplopia and Crash Risk

The MEP did not recommend any change in the standard for diplopia.

Justification

Since there was insufficient evidence to determine whether diplopia increases crash risk, the panel believed a change in standard was not justified.

APPENDIX A: Findings of Evidence Report

This appendix summarizes the findings of the Evidence Report titled, "Vision and Commercial Motor Vehicle Driver Safety." The purpose of this evidence report was to address several key questions posed by the FMCSA. Each of the key questions was developed by the FMCSA such that the answers would provide information the Agency believed would be useful in updating its current medical examination guidelines. The five key questions addressed were:

Key Question 1: Is monocular vision associated with an increased crash risk?

Key Question 2: Do red-green color deficiencies (either protan or deutan) increase crash risk?

Key Question 3: Is VF loss associated with an increase in crash risk? And, if affirmative, what is the acceptable VF range in the horizontal and vertical meridian?

Key Question 4: Do cataracts increase crash risk? And, if affirmative, does cataract surgery reduce this risk?

Key Question 5: Is diplopia associated with increased crash risk?

Identification of Evidence Bases

Separate evidence bases for each of the key questions addressed by the evidence report were identified through a comprehensive search of the literature, examination of abstracts of identified studies to determine which articles would be retrieved, and selection of the actual articles that would be included in each evidence base.

A total of seven electronic databases (Medline, PubMed [pre Medline], EMBASE, PsycINFO, CINAHL, TRIS, the Cochrane library) were searched (through December 3, 2007). In addition, we examined the reference lists of all obtained articles to identify relevant articles not identified by our electronic searches. We also did hand searches of the "gray literature." Admission of an article into an evidence base was determined by formal retrieval and inclusion criteria determined a priori.

Grading the Strength of Evidence

Quality assessment of the evidence took into account not only the quality of the individual studies that comprise the evidence base for each key question; we also considered the interplay between the quality, quantity, robustness, and consistency of the overall body of evidence.

Presentation of Findings

The strength-of-evidence ratings assigned to our conclusions are defined in Table 2.

Table 2 Strength of Evidence Ratings

Strength of Conclusion	*Interpretation*
Strong evidence	Evidence supporting the qualitative conclusion is convincing. It is highly unlikely that new evidence will lead to a change in this conclusion.
Moderate	Evidence supporting the qualitative conclusion is somewhat convincing. There is a small chance that new evidence will overturn or strengthen our conclusion. ECRI Institute recommends regular monitoring of the relevant literature for moderate-strength conclusions.
Acceptable	Although some evidence exists to support the qualitative conclusion, this evidence is tentative and perishable. There is a reasonable chance that new evidence will either overturn or strengthen our conclusions. ECRI Institute recommends frequent monitoring of the relevant literature.
Unacceptable	Although some evidence exists, the evidence is insufficient to warrant drawing an evidence-based conclusion. ECRI Institute recommends frequent monitoring of the relevant literature.

Evidence-Based Findings

The findings of our analyses of the data pertaining to the five key questions addressed in the evidence report are summarized below. They are presented in two sections. The first section was presented to the MEP in December 2007. The second section represents the findings of our analyses of the data after making changes to the evidence based recommended by the MEP.

Section 1 – Original Findings

Key Question 1: Is monocular vision associated with an increased crash risk?

Due to a paucity of consistent findings, the evidence is insufficient to determine whether individuals with monocular vision are at increased risk of a crash.

The confidence in evidence for all four included studies in the evidence base is low. Two of the studies showed no evidence of increased crash risk associated with monocular vision. A third study (Keeney et al.(15)) provided evidence of increased crash risk among monocular drivers compared to that in the general driver population. However, as this was a low quality study, the possibility of a Type I error (falsely accepting the study hypothesis of increase in crash risk when no true difference may exist) is increased. Regardless of the cause, the findings of the studies in this evidence base were inconsistent; therefore, no evidence-based conclusion was possible.

The scarcity of data from studies enrolling CMV drivers with monocular vision precludes one from determining whether CMV drivers with monocular vision are at an increased risk for a motor vehicle crash. The fourth consisted of a low quality cohort study which evaluated safe driving performance among CMV drivers with monocular vision and binocular vision. While this was the only study related to CMV drivers, it was not able to assess crash among CMV drivers with monocular vision. Consequently, one cannot draw an evidence-based conclusion to determine whether CMV drivers are at an increased risk for a motor vehicle crash. Whether this group of drivers with monocular vision is overrepresented in populations of drivers who have experienced a motor vehicle crash cannot be determined at this time.

Key Question 2: Do red-green color deficiencies (either protan or deutan) increase crash risk?

The evidence is insufficient to determine whether red-green color deficiencies increase crash risk.

The confidence in evidence for all three included studies in the evidence base is low. All studies provided either: a self-report of driving performance or used simulated driving performance tasks to evaluate traffic signal recognition among non-CMV drivers with color-deficient vision and normal vision. One of the three included studies provided no evidence of increased crash risk with noncommercial drivers. This was the only study that provided actual crash data (self-reported) from which crash risk could be determined. The remaining two studies evaluated indirect outcomes (signal recognition and response time performance), which may or may not be associated with crash risk. These studies showed greater mistakes in signal recognition and longer response times among color-deficient individuals relative to color-normal individuals. We were not able to assess crash risk among CMV drivers with red-green color deficiency. The paucity of data from studies enrolling CMV drivers with red-green color defective vision precludes one from determining whether CMV drivers with this type of vision defect are at an increased risk for a motor vehicle crash.

Key Question 3: Is visual field loss associated with an increase in crash risk? And, if affirmative, what is the acceptable visual field range in the horizontal and vertical meridian?

Drivers with visual field loss measured by standard perimetry are at an increased risk of crash (Strength of Evidence: Minimally Acceptable).

- **A precise estimate of the magnitude of increase in risk cannot be determined at the present time**

Drivers with visual field loss measured by the Useful Field of View (UFOV) test are at an increased risk of crash (Strength of Evidence: Moderate).

- **A precise estimate of the magnitude of increase in risk cannot be determined at the present time**

Due to differences in reported measures and cutoffs, no conclusion was possible regarding what is an acceptable visual field range based on standard perimetry. However, a visual field loss of ≥40% on the UFOV test is associated with an increased risk of crash (Strength of Evidence: Moderate).

The evidence base for this key question included a total of 16 studies. Twelve of these studies assessed the relationship between crash risk and visual field loss as measured by standard perimetry (automated or manual). Due to differences in patient characteristics, perimetry tests, cutoffs for judging visual field loss, type of crash data, summary statistics, and adjustments of

summary statistics, a precise quantitative estimate of effect could not be obtained. However, eight of the 12 studies showed a statistically significant increase in crash risk associated with visual field loss. Because the median quality of the evidence base was low, the strength of evidence is considered minimally acceptable.

Six studies (in seven publications) assessed the relationship between crash risk and visual field loss as measured by the UFOV test. All six studies showed a statistically significant increase in crash risk associated with visual field loss. Due to differences in the implementation of UFOV (full test or subtests), summary statistics, adjustments for potential confounding factors, and types of crash reported among different studies, a quantitative estimate of effect could not be obtained. However, since the direction of effect was consistent and significant in all studies, the findings were robust. When considered with the moderate quality(media measurement) of the evidence base, this means that the strength of evidence for this comparison is moderate.

Differences among the measures and cutoffs used in studies of visual field range (as measured via standard perimetry) meant that a conclusion regarding what constituted an acceptable visual field range could not be reached. However, three studies found a statistically significant increase in crash risk associated with a ≥40% loss in visual field on the UFOV test. Although these were the only studies to report using this cutoff, the findings were consistent. Combined with the moderate quality(median measurement) of these studies, this means that the strength of evidence for this finding is moderate.

Key Question 4: Does cataract increase crash risk? And, if affirmative, does cataract surgery reduce this risk?

Due to inconsistency among the findings of different studies, the evidence is insufficient to determine whether cataract increases crash risk. The possibility that untreated cataracts increase crash risk cannot be ruled out.

Three studies reported crash risk of drivers with cataract. Two of those studies did not find an increased risk compared to controls without cataract. One study found an increased risk of crash for individuals with cataracts when compared to controls without cataracts. The two studies that found no increased risk did not report whether drivers had been treated with cataract surgery. The one study that found an elevated crash risk for drivers with cataract (compared to controls without cataract) assessed drivers who had not had cataract surgery. Another publication in the same series of that study found that drivers who did not have surgery for their cataract(s) crashed more than drivers who had surgery.

Additional studies of indirect evidence support the contention that drivers with untreated cataracts may have an elevated crash risk. One such study suggests that driving ability is significantly decreased and self-reported driving difficulty is increased among drivers with untreated cataracts, and that driving ability of cataract patients improves post-surgically.

Evidence from additional studies consistently suggests that visual acuity is impaired among individuals with untreated cataract(s), and that visual function improves following surgery.

Although one crash study and supporting non-crash evidence suggests that untreated cataracts are associated with increased crash risk, two crash studies did not find an association between cataract and crash. The small size of this evidence base prohibits exploration of potential factors that might explain the different findings. Therefore, the available evidence does not permit a conclusion regarding the relationship between cataract and crash. Furthermore, the generalizability of these findings to CMV drivers is unclear; it does not appear that any commercial drivers were represented in the studies.

Key Question 5: Is diplopia associated with increased crash risk?

There is insufficient evidence to determine whether diplopia increases crash risk.

A single small study of moderate quality provided self-reported driving performance through response and reaction time recognition in simulated driving performance tasks among non-CMV drivers with diplopia and non-diplopic vision. No study directly compared crashes among diplopic and non-diplopic drivers. Although the included study did not provide evidence of increased risk among diplopic drivers of any type, a single small study is insufficient to rule out an increase in risk. Moreover, we were not able to assess crash risk among CMV drivers with diplopia. The lack of data from studies enrolling CMV drivers with diplopia precludes one from determining whether CMV drivers with this type of vision impairment are at an increased risk for a motor vehicle crash. Thus, one cannot determine from the existing evidence base whether diplopic CMV drivers are at an increased risk for a motor vehicle crash.

Section 2 –Amended Findings

Key Question 1: Is monocular vision associated with an increased crash risk?

Due to methodological limitations and inconsistency among the findings of different studies, the available evidence is insufficient to determine whether individuals with monocular vision are at increased risk of a crash at this time. The possibility that individuals with monocular vision have an increased crash risk cannot be ruled out.

Direct Evidence – Crash Studies: Our searches identified one study that examined whether monocular CMV drivers are at an increased risk for a crash. This was a large study of all drivers with a CMV license in California. Due to methodological flaws, the quality of this study is low. The authors performed analysis of covariance (ANCOVA) with adjustment for age to compare the mean crashes/driver among three comparison groups based on visual acuity (normal, moderately impaired, and severely impaired) over a two-year period. Severely impaired meant that the drivers had monocular vision. The Dunn-Bonferroni procedure for pairwise comparisons found that monocular drivers had a significantly greater ($p < 0.05$) mean crash rate than non-impaired drivers for both Class 1 and Class 2 licenses (analyzed separately). However, when only drivers with commercial license plates were analyzed, monocular drivers did not have

a significantly greater mean crash rate than non-impaired drivers. A major limitation of this analysis is the restriction of monocular drivers to intrastate driving, while unimpaired drivers were allowed to drive out of state. While there is some evidence that this restriction was not well-enforced, it nevertheless creates a potential bias because out-of-state crashes are not recorded by the state of California. Thus, the mean crash rate for unimpaired CMV drivers may be underestimated in this study.

Three studies provided crash data for monocular drivers in general driver populations. Because of a number of methodological flaws, our confidence in the findings of all three of these studies is low. While two included studies found no evidence to support the contention that individuals with monocular vision are at an increased risk for a motor vehicle crash, the third study did find an association between monocular vision and increased crash risk.

Given the low quality of the included studies and the fact that the findings of these studies are inconsistent, we do not draw an evidence-based conclusion at this time.

Indirect Evidence – Driving Simulator Studies: Our searches identified a single study that indirectly assessed crash risk among individuals with monocular vision by evaluating safe driving performance among CMV cohorts of drivers with monocular vision and binocular vision. This low quality cohort study concluded that individuals with monocular vision experienced a number of visual deficits, including decreased contrast sensitivity, problems with binocular depth perception, and decreased VA in low light and glare situations. They also experienced deficits in driving functions related to these visual problems, most specifically in those functions related to binocular vision such as daytime and nighttime sign reading at a distance. There were no significant differences between monocular and binocular vision drivers in visual tests assessing static acuity, dynamic acuity, or glare recovery; or in driving performance tests such as information recognition, mirror checks, lane keeping, clearance judgment, or gap judgment.

Key Question 2: Do red-green color deficiencies (either protan or deutan) increase crash risk?

The evidence is insufficient to determine whether red-green color deficiencies increase crash risk.

Direct Evidence – Crash Studies: A single included study reported on the association between color vision deficiency and crash (self-reported). This study did not provide any evidence in support of the contention that individuals with red-green color deficiencies are at an increased risk for a crash. However, a single low-quality study is insufficient evidence to allow any conclusion concerning crash risk; more data is required.

Indirect Evidence – Driving Simulator Studies: Two studies of low methodologic quality provided either a self-report of driving performance or used simulated driving performance tests to evaluate traffic signal recognition among non-CMV drivers with color-deficient vision and normal vision. Individuals with color deficiency were less proficient in signal recognition and

demonstrated longer response times than color-vision normal individuals. Whether these observed deficits are factors that may contribute to an increased crash risk is unclear.

Key Question 3: Is visual field (VF) loss associated with an increase in crash risk? And, if affirmative, what is the acceptable VF range in the horizontal and vertical meridian?

Drivers with VF loss measured by standard perimetry are at an increased risk of crash (Strength of Evidence: Minimally Acceptable).

- **A precise estimate of the magnitude of increase in risk cannot be determined at the present time.**
- **Due to differences in reported measures and cutoffs, no conclusion is possible at this time regarding the degree and pattern of visual field loss that is most strongly associated with the increased crash risk.**

Drivers with reduced useful field of view measured by the UFOV test are at an increased risk of crash (Strength of Evidence: Moderate).

- **A precise estimate of the magnitude of increase in risk cannot be determined at the present time.**
- **A ≥40% reduction in UFOV is associated with an increased risk of crash (Strength of Evidence: Moderate).**

Direct Evidence – Crash Studies: The evidence base for this key question included a total of 14 studies (in 16 publications). Two separate analyses were performed: an analysis of the findings of studies that examined the association between VF loss and crash risk using standard perimetry testing (any method), and an analysis of studies that examined the association between UFOV and crash risk.

Twelve of these studies assessed the relationship between crash risk and VF loss as measured by standard perimetry (automated or manual). Due to differences in patient characteristics, perimetry tests, cutoffs for judging VF loss, type of crash data, summary statistics, and adjustments of summary statistics, a precise quantitative estimate of effect could not be obtained. However, eight of the twelve studies showed a statistically significant increase in crash risk associated with VF loss. Because the median quality of the evidence base was low, the strength of evidence is considered minimally acceptable. Populations most likely to contain drivers with VF loss associated with increased crash risk include drivers with glaucoma, retinitis pigmentosa, and to a lesser extent, older drivers (>54 years of age). Although slightly more evidence supports peripheral VF loss as having a greater impact on crash risk than central VF loss, only four studies separately evaluated both types of VF loss, and there were differences among studies that only examined one type of VF loss. Therefore, the relative impact of peripheral VF loss versus central VF loss on crash risk could not be determined with certainty.

Differences among the measures and cutoffs used in studies of VF range meant that a conclusion regarding what constituted an acceptable VF range could not be reached based on standard perimetry.

Six studies (in seven publications) assessed the relationship between crash risk and reduced useful field of view as measured by the UFOV test. All six studies showed a statistically significant increase in crash risk associated with VF loss. Due to differences in the implementation of UFOV (full test or subtests), summary statistics, adjustments for potential confounding factors, and types of crash reported among different studies, a quantitative estimate of effect could not be obtained. However, since the direction of effect was consistent and significant in all studies, the findings were robust. When considered with the moderate quality (median measurement) of the evidence base, this means that the strength of evidence for this comparison is moderate.

Three studies found a statistically significant increase in crash risk associated with a ≥40% reduction in UFOV. Although these were the only studies to report using this cutoff, the findings were consistent. Combined with the moderate quality (median measurement) of these studies, this means that the strength of evidence for this finding is moderate.

The generalizability of these findings to CMV drivers is unclear, as none of the studies reported whether any commercial drivers comprised part of the study population.

Key Question 4: Do cataracts increase crash risk? And, if affirmative, does cataract surgery reduce this risk?

Due to inconsistency among the findings of different studies, the evidence is insufficient to determine whether cataracts increase crash risk. The possibility that cataracts increase crash risk cannot be ruled out.

Direct Evidence – Crash Risk: Four studies that met our inclusion criteria for this key question examined the impact of cataracts on crash risk directly. One of these studies found that individuals with cataracts are at an increased risk for a motor vehicle crash; the remaining three studies did not. The latter three studies did not report on the severity of cataracts; two did not report on whether their enrollees had been treated with cataract surgery.

The study that found an increased risk of crash for individuals with cataracts when compared to controls without cataracts reported that drivers who did not have surgery for their cataract(s) crashed more than drivers who had surgery. Another study did not find a difference in crash risk between drivers with surgically treated cataracts and drivers with cataract who had not undergone surgery; this study had not found an increased crash risk for drivers with cataracts compared to drivers without cataracts.

Indirect Evidence – Studies of Driving Simulation and Self-Reported Difficulty Driving: One of the crash studies, along with three additional studies in the evidence base, investigated indirect evidence to support the contention that drivers with cataracts may have an elevated crash risk.

One such study suggests that driving ability is significantly decreased and self-reported driving difficulty is increased among drivers with cataracts, and that the driving ability of cataract patients improves after surgery to treat the disorder. Evidence from the additional studies consistently suggests that individuals with cataract(s) have greater difficulty driving than individuals without cataracts, and that driving ability improves following surgery.

Overall Summary: Although one crash study and supporting indirect evidence suggests that cataracts are associated with increased crash risk, three other crash studies did not find an association between cataract and crash. The small size of this evidence base prohibits exploration of potential factors that might explain the different findings. Therefore, the available evidence does not permit a conclusion regarding the relationship between cataract and crash. Furthermore, the generalizability of these findings to CMV drivers is unclear; it does not appear that any commercial drivers were represented in the studies.

Key Question 5: Is diplopia associated with increased crash risk?

There is insufficient evidence to determine whether diplopia increases crash risk.

Direct Evidence – Crash Studies: A single low-quality study reported on the association between diplopia and crash risk among non-CMV drivers. This study did not provide any evidence in support of the contention that individuals with diplopia are at an increased risk for a crash. However, a single low-quality study is insufficient evidence to allow any conclusion concerning crash risk; more data is required.

Indirect Evidence – Driving Simulator Studies: A single small study of moderate quality provided self-reported driving performance through response and reaction time recognition in simulated driving performance tasks among non-CMV drivers with diplopia and non-diplopic vision. Although the included study did not provide evidence of increased risk among diplopic drivers of any type, and is therefore consistent with the findings of the crash study, two studies of low-to-moderate quality are insufficient to rule out an increase in risk. Moreover, we were not able to assess crash risk among CMV drivers with diplopia. The lack of data from studies enrolling CMV drivers with diplopia precludes one from determining whether CMV drivers with this type of vision impairment are at an increased risk for a motor vehicle crash. Thus, one cannot determine from the existing evidence base whether diplopic CMV drivers are at an increased risk for a motor vehicle crash.

APPENDIX B: Current Standards and Guidelines for Visual Disorders

Current Medical Fitness Standards and Guidelines for CMV drivers in the United States

FMCSA Regulations, found in 49 Code of Federal Regulations (CFRs) 301 through 399, cover businesses that operate CMVs in interstate commerce. FMCSA regulations that pertain to fitness to drive a commercial vehicle are found in 49 CFR 391 Subpart E. Only motor carriers engaged purely in intrastate commerce are not directly subject to these regulations. However, intrastate motor carriers are subject to state regulations, which must be identical to, or compatible with, the Federal regulations in order for states to receive motor carrier safety grants from FMCSA. States have the option of exempting CMVs with a gross vehicle weight rating of less than 26,001 lbs.

The current medical qualification standard for fitness to drive a CMV (49 CFR 391.41(b) 391.41(b)(10))states the following (see: http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.asp?section=391.41):

A person is physically qualified to drive a CMV if that person —

- Has distant VA of at least 20/40 (Snellen) in each eye without corrective lenses or VA separately corrected to 20/40 (Snellen) or better with corrective lenses, distant binocular acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses, field of vision of at least 70° in the horizontal meridian in each eye, and the ability to recognize the colors of traffic signals and devices showing standard red, green, and amber.

The term "ability to recognize the colors of" is interpreted to mean if a person can recognize and distinguish among traffic control signals and devices showing standard red, green, and amber, he or she meets the minimum standard, even though he or she may have some type of color perception deficiency. If certain color perception tests are administered (such as Ishihara, Pseudoisochromatic, Yarn, etc.), and doubtful findings are discovered, a controlled test using signal red, green, and amber may be employed to determine the driver's ability to recognize these colors.

Contact lenses are permissible if there is sufficient evidence to indicate that the driver has good tolerance and is well adapted to their use. Use of a contact lens in one eye for distant VA and another lens in the other eye for near vision is not acceptable, nor are telescopic lenses acceptable for driving CMVs.

If an individual meets the criteria by the use of glasses or contact lenses, the following statement shall appear on the Medical Examiner's Certificate: "Qualified only if wearing corrective lenses." CMV drivers who do not meet the Federal vision standards may call (202) 366-4001.

Additional information on Visual Disorders and Commercial Drivers supported at http://www.fmcsa.dot.gov/rulesregs/medreports.htm

Medical Fitness Standards and Guidelines for Other Forms of Transportation in the U.S.

Current medical fitness standards and guidelines for other comparable forms of transportation in the U.S. are summarized in Table 3. Included in the table are pertinent rules and guidance for pilots, railroad workers, and merchant mariners.

Table 3 Standards and Guidelines for Vision from U.S. Government Transportation Safety Agencies

Condition	FAA* (all classes of airmen)	Railroad†	Merchant Mariner‡
Vision	**AME Assisted - All Classes** **Glaucoma** AME Assisted Special Issuance (AASI) is a process that provides Examiners the ability to re-issue an airman medical certificate under the provisions of an Authorization for Special Issuance of a Medical Certificate (Authorization) to an applicant who has a medical condition that is disqualifying under Title 14 of the Code of Federal Regulations (14 CFR) part 67. Examiners may re-issue an airman medical certificate under the provisions of an Authorization, if the applicant provides the following: • An Authorization granted by the FAA; • Certification only granted for open-angle-glaucoma and ocular hypertension; • The FAA Form 8500-14, Glaucoma Eye Evaluation Form is filled out by the treating eye specialist; and • A set of VF measurements is provided. The Examiner must defer to the AMCD or Region if: • The FAA Form 8500-14 Glaucoma Eye Evaluation Form demonstrates VA incompatible with the medical standards; or • There is a change in VF or adverse change in ocular pressure. **Aerospace Medical Dispositions** **Item 52. Color Vision** An applicant does not meet the color vision standard if testing reveals: **All Classes** • Seven or more errors on plates 1-15 of the AOC (1965 edition) pseudoisochromatic plates. • AOC-HRR (second edition): Any error in test plates 7-11. Because the first 4 plates in the test book are for demonstration only, test plate 7 is actually the eleventh plate in the book. (See instruction booklet.) • Seven or more errors on plates 1-15 of Dvorine pseudoisochromatic plates (second edition, 15 plates.) • Six or more errors on plates 1-11 of the concise 14-plate edition of the Ishihara pseudoisochromatic plates. Seven or more errors on plates 1-15 of the 24-plate edition of Ishihara pseudoisochromatic plates. Nine or more errors on plates 1-21 of the 38-plate edition of Ishihara pseudoisochromatic plates. • Seven or more errors on plates 1-15 of the Richmond (1983 edition) pseudoisochromatic plates. • Farnsworth Lantern test: An average of more than one error per series of	With few exceptions, most railroads have no specific medical standards	Potentially disqualifying conditions listed in the Physical Evaluation Guidelines for Merchant Mariner's Documents and Licenses included any disease or constitutional defect which would result in gradual deterioration of performance of duties, sudden incapacitation or otherwise compromise shipboard safety, including required response in an emergency situation. Vision guidelines and standards include the following: *VA:* Deck Officer—the applicant must have vision correctable to 20/40 in each eye Engineer Officer—the applicant must have vision correctable to 20/50 in each eye In all cases, the uncorrected vision should be at least 20/800. A vision waiver may be granted if the applicant's corrected vision in the better eye is at least 20/40. Waivers will not be granted where any disease or condition exists that would cause a progressive or degenerative VA beyond the standards for a waiver. The applicant must have 100 degrees horizontal field of vision. All applicants with diabetes must submit documentation from their doctor that the diabetes is not affecting their eyesight. *Color Vision:* Deck Officer—the applicant must have the ability to recognize basic colors in order to recognize color-coded indicator lights, diagrams, piping systems, valve and wiring. Deck officers must also be able to recognize colored lights that are used on aids to navigation, such as navigation lights on vessels Engineer Officer—the applicant must have the ability to distinguish the colors red, green, blue and yellow Satisfactory completing of any of the following methods is acceptable proof of color sense: Pseudoisochromatic Plates (Dvorine, 2nd Edition: AOC: revised edition or AOC-HRR; Ishihara 16-, 24-, or 38 plate editions) Eldrige Green Color Perception Lantern Farnsworth Lantern Keystone Orthoscope Keystone Telebinocular SAMCTT (School of Aviation Medicine Color Threshold Tester) Titmus Optical Vision Tester Williams Lantern Monocular vision: In the case of an applicant with loss of sight in one

Condition	FAA* (all classes of airmen)	Railroad†	Merchant Mariner‡
	nine color pairs in series 2 and 3. (See instruction booklet.) • Any errors in the six plates of the Titmus Vision Tester, the Titmus II Vision Tester, the Titmus 2 Vision Tester, the OPTEC 2000 Vision Tester, the OPTEC 900 Vision Tester the Keystone Orthoscope, or Keystone Telebinocular. • LKC Technologies, Inc., APT-5 Color Vision Tester. The letter must be correctly identified in at least two of the three presentations of each test condition. (See APT-5 screening chart for FAA-related testing in instruction booklet.) • Certificate Limitation. If an applicant fails to meet the color vision standard as interpreted above but is otherwise qualified, the Examiner may issue a medical certificate bearing the limitation: **NOT VALID FOR NIGHT FLYING OR BY COLOR SIGNAL CONTROL** • Special Issuance of Medical Certificates. An applicant who holds a medical certificate bearing a color vision limitation may request a signal light test. This request should be in writing and should be directed to the AMCD or RFS. If the applicant passes the signal light test, the FAA will issue a medical certificate without the color vision limitation and provide the applicant with a "letter of evidence." The signal light test may be given at any time during flight training. • Color Vision Correcting Lens (e.g. X-Chrom). Such lenses are unacceptable to the FAA as a means for correcting a pilot's color vision deficiencies. • Yarn Test. Yarn tests are not acceptable methods of testing for the FAA medical certificate. **Aerospace Medical Dispositions** **Item 50. Distant Vision** When corrective lenses are required to meet the standards, an appropriate limitation will be placed on the medical certificate. For example, when lenses are needed for distant vision only: HOLDER SHALL WEAR CORRECTIVE LENSES For multiple vision defects involving distant and/or intermediate and/or near vision when one set of monofocal lenses corrects for all, the limitation is: HOLDER SHALL WEAR CORRECTIVE LENSES For combined defective distant and near VA where multifocal lenses are required, the appropriate limitation is: HOLDER SHALL WEAR LENSES THAT CORRECT FOR DISTANT VISION AND POSSESS GLASSES THAT CORRECT FOR NEAR VISION For multiple vision defects involving distant, near, and intermediate VA when more than one set of lenses is required to correct for all vision defects, the appropriate limitation is: HOLDER SHALL WEAR LENSES THAT CORRECT FOR DISTANT VISION AND POSSESS GLASSES THAT CORRECT FOR NEAR AND		eye, medical information indicates that depth perception may be affection. The degree of loss or lack of depth perception varies among individuals. The degree of variability is affected by the length of time that the applicant has been sightless in the eye and by the applicant's ability to compensate. Applicants must be evaluated individually to determine that they adequately compensate for their lack of vision and that they can safely work in the maritime environment. Such applicants shall provide letters of recommendation from former employers or co-workers attesting to their ability to perform duties similar to the duties required by the license or document sought. In cases where an applicant is unable to provide such documentation, for example, where loss of sight has recently occurred, a waiver may be based on a thorough medical report from an ophthalmologist. This report must substantiate that the applicant has compensated for the loss of depth perception and peripheral vision. All cases involving monocular vision must be forwarded to the National Maritime Center (NMC-4C) for resolution. Persons requiring the use of glasses or contact lens to perform duties will be required to have a spare pair conveniently available on board the ship. Any need to wear visual aids to meet the required standards will be recorded on each license or documented issued. **GENERAL INFORMATION FOR MERCHANT MARINER'S DOCUMENTS, LICENSES, AND STCW CERTIFICATES** **REQUIRED MEDICAL INFORMATION** A medical waiver from the Officer In Charge, Marine Inspection (OCMI) is required whenever a Merchant Mariner Physical Examination Report (CG-719K) reveals a medical condition that may affect your ability to perform the duties of the license or MMD applied for. Please provide a signed medical history statement from your doctor under his letterhead that includes the information below. **STANDARD INFORMATION REQUIRED** 1. The date on which the diagnosis was made. 2. A complete list of medications (current and past), including dosage and possible side effects. 3. Any limitations in the performance of your professional duties. 4. A prognosis of the potential deterioration or correction of your condition. **Medical conditions include:** **Vision problem:** Results of a recent (within one year) vision exam is required that includes both uncorrected and corrected vision, field of vision, and color vision.

Condition	FAA* (all classes of airmen)	Railroad†	Merchant Mariner‡
	INTERMEDIATE VISION An applicant who fails to meet vision standards and has no SODA that covers the extent of the VA defect found on examination may obtain further FAA consideration for grant of an Authorization under the special issuance section of part 67 (14 CFR 67.401) for medical certification by submitting a report of an eye evaluation. The Examiner can help to expedite the review procedure by forwarding a copy of FAA Form 8500-7, Report of Eye Evaluation that has been completed by an eye specialist (optometrist or ophthalmologist). Applicants who do not meet the visual standards should be referred to a specialist for evaluation. Applicants with VA or ocular muscle balance problems may be referred to an eye specialist of the applicant's choice. The FAA Form 8500-7, Report of Eye Evaluation, should be provided to the specialist by the Examiner. Amblyopia. In amblyopia ex anopsia, the VA of one eye is decreased without presence of organic eye disease, usually because of strabismus or anisometropia in childhood. In amblyopia ex anopsia, the VA loss is simply recorded in Item 50 of FAA Form 8500-8, and visual standards are applied as usual. If the standards are not met, a report of eye evaluation, FAA Form 8500-7, should be submitted for consideration. [24] In obtaining special eye evaluations in respect to the airman medical certification program or the air traffic controller health program, reports from an eye specialist are acceptable when the condition being evaluated relates to a determination of VA, refractive error, or mechanical function of the eye. The FAA Form 8500-7, Report of Eye Evaluation, is a form that is designed for use by either optometrists or ophthalmologists. Any applicant eligible for a medical certificate through special issuance under these guidelines shall pass a MFT, which may be arranged through the appropriate agency medical authority. While waiting to complete a MFT, an applicant who is otherwise qualified for certification may be issued a medical certificate, which must contain the limitation: **Guide for Aviation Medical Examiners** **Decision Considerations** **Disease Protocols** **Binocular Multifocal and Accommodating Devices** This Protocol establishes the authority for the Examiner to issue an airman medical certificate to binocular applicants using multifocal or accommodating ophthalmic devices. Devices acceptable for aviation-related duties must be FDA approved and include: Intraocular Lenses (multifocal or accommodating intraocular lens implants) Bifocal/Multifocal contact lenses Examiners may issue as outlined below:		

Condition	FAA* (all classes of airmen)	Railroad†	Merchant Mariner‡
	Adaptation period before certification: Postoperative period is 3 months for cataract surgery Multifocal (including bifocal) contact lenses requires at least 1 month Must provide a report to include the FAA Form 8500-7, Report of Eye Evaluation, from the operating surgeon or the treating eye specialist. This report must attest to stable VA and refractive error, absence of significant side effects/complications, need of medications, and freedom from any glare, flares or other visual phenomena that could affect visual performance and impact aviation safety The following visual standards, as required for each class, must be met for each eye: **Distant:** First- and Second-Class 20/20 or better in each eye separately, with or without correction Third-Class 20/40 or better in each eye separately, with or without correction **Near:** All Classes 20/40 or better in each eye separately (Snellen equivalent), with or without correction, as measured at 16 inches **Intermediate:** First- and Second-Class 20/40 or better in each eye separately (Snellen equivalent), with or without correction at age 50 and over, as measured at 32 inches Third-Class No requirement **Note**: The above does not change the current certification policy on the use of monofocal non-accommodating intraocular lenses.		

*Source of information for FAA Regulations and Guidelines: http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/special_iss/all_classes/glaucoma/
http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item52/amd/
http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/app_process/exam_tech/item50/amd/
http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/aam/ame/guide/dec_cons/disease_prot/binocular/
†Source of information for Federal Railroad Administration Guidelines: http://www.fra.dot.gov/downloads/safety/hazmatch4.pdf
‡ Source of information for Merchant Mariner Guidelines: http://www.uscg.mil/hq/g-m/nvic/2_98/n2-98.pdf

Vision Guidelines and Medical Standards from Other Countries

Regulatory standards and guidance pertaining to vision and CMV driving in the European Union, Canada, Israel, Australia, United Kingdom, New Zealand, India, South Africa, Ireland and Sweden are presented in Table 4.

Distinct worldwide policies by category include:

- **Color Vision :** A person is unfit to drive with color blindness in *India*
- **Diplopia:** Individuals may drive if diplopia can be completely corrected with a patch or prisms in *Canada*
- **Glare:** Commercial drivers may be limited to daytime driving in *New Zealand and Canada*
- **Night Driving:** CMV drivers are unfit to drive in *Sweden and India*
- **Stereo Vision:** *Canadian* officials trust that individuals can learn to judge distance even those who have lost sight in one eye
- **VA:** In *Israel*, drivers must have a minimum combined acuity of 6/12
- **VF:** European Union member states dictate *normal* VFs should be present in both eyes

Table 4 Vision Disorders (Guidelines and Medical Standards from Other Countries)

Country	Reference	Color vision	Diplopia	Glare	Night driving	Stereo-vision and depth perception	VA	VF	General
European Union	European Commission on Transport and Road Safety, Annex III to Directive 91/439/EEC; Council Directive 96/47/EC July 1996 amending Directive 91/439/EEC; IP/06/381 Member States Agree on the European Driving License 27 March 2006 ▪ Countries involved include: Austria*,Finland*, Sweden*, Belgium, Ireland, Denmark, Italy, Germany, Luxembourg, Greece, The Netherlands, Spain, Portugal, France and The United Kingdom (29 July 1991) ▪ Member states had to apply directive 91/439/EEC by 1 July 1996. ▪ European member states have to stay within a Council directive: they can be more restrictive, but not more liberal. *added in Council Directive 96/47/EC July 1996	No requirements included.	Driving licenses shall not be issued to or renewed for applications or drivers suffering from diplopia.	No requirements included.	No requirements included. Please see recommended new standards by the Eyesight Working Group		Must have VA, with corrective lenses if necessary, of at least 0,8 in the better eye and at least 0,5 in the worse eye. If corrective lenses are used to attain the values of 0,8 and 0,5 the uncorrected acuity in each eye must reach 0,05, or else the minimum acuity (0,8 and 0,5) must be achieved either by means of glasses with power not exceeding plus or minus four dioptres or with the aid of contact lenses (uncorrected vision = 0,05). The correction must be well tolerated. Please see recommended new standards by the Eyesight Working Group	Driving licenses shall not be issued to or renewed for applications or drivers without a normal binocular field of vision. Please see recommended new standards by the Eyesight Working Group	All applicants for a driving license shall undergo an appropriate investigation to ensure that they have adequate VA for driving power-driven vehicles. Where there is reason to doubt that the applicant's vision is inadequate, he shall be examined by a competent medical authority. At this examination, attention shall be paid to the following in particular: VA, field of vision, twilight vision and progressive eye diseases. Under the current directive, it is possible to offer a restricted license to drivers. Codes 05.01 to 05.04 restrict driving respectively to day-time, a certain radius, without passengers or with a speed limit. Additionally, the validity of the license may be time-limited. There is no guidance as to how these codes or limitations should be applied.
Canada	Determining medical fitness to Operate Motor Vehicles. CMA (Canadian Medical Association) Driver's Guide 7th edition. (2006)	No standards exist however all drivers should be able to discriminate among traffic lights.	Within the central 40° (i.e., 20° to the left, right, above and below fixation) of primary gaze is incompatible with safe driving for all classes of license. Individuals with uncorrected diplopia within the central 40° of primary gaze should be referred	No standards exist however partial loss of the ability to recover rapidly from exposure to glaring headlights may at times justify limiting driving to daylight hours.	No standards exist however partial loss of the ability to adapt to decreased illumination may at times justify limiting driving to daylight hours.	Most individuals can learn to judge distance even those who have lost sight in one eye.	Not less than 20/30(6/9) with both eyes open and examined together. Worse eye not less than 20/400 (6/120) Several jurisdictions require an acuity higher than 20/400 (6/120) in the worse eye. Quebec has a standard of 20/70 (6/21) and Ontario's is 20/100 (6/30).	150° continuous along the horizontal meridian and 20° continuous above and below fixation with both eyes open and examined together.	

Country	Reference	Color vision	Diplopia	Glare	Night driving	Stereo-vision and depth perception	VA	VF	General
			for additional assessment. An individual may be eligible to drive if the diplopia can be completely corrected with a patch or prisms. An adjustment period of 3 months is recommended prior to resuming driving.						
Israel	Ministry of Transportation Information Department Spokesman's Office Everything You Wanted To Know About Driver's and Vehicle Licenses www.mot.gov.il						Minimum combined acuity of 6/12		
Australia	Assessing Fitness to Drive (For Commercial and Private Vehicle Drivers) Medical Standards for Licensing and Clinical Management Guidelines. Austroads and NTC (National Transport Commission) Australia (2006)					No specific standards. (see 23.2.6) 23.2.6. Dark Adaptation Health professionals may wish to recommend restrictions on the driver licenses of individuals who appear the meet the visual criteria in the clinical setting but may, in certain environments, have extreme difficulty. Examples of such restrictions might be 'daylight driving only'.	The criteria for an **unconditional license** are not met: • If the person's VA is worse than 6/9 in the better eye; OR • If the person's VA is worse than 6/18 in either eye. A conditional license may be granted by the Driver Licensing Authority, taking into account the opinion of an ophthalmologist or optometrist or GP, and the nature of the driving task, and subject to periodic review: • If the standard is met with corrective lenses; and • After consideration of the nature of any underlying disorder. (see 23.2.5) A **conditional license** may be granted by the	The criteria for an unconditional license are not met: • If the person has any VF defect. A conditional license may be granted by the Driver Licensing Authority, taking into account the opinion of an ophthalmologist or optometrist, and the nature of the driving task, and subject to periodic review: • If the binocular VF has an extent of at least 140 degrees within 10 degrees above and below the horizontal midline; and • If the person has no significant VF loss (scotoma, hemianopia, quadrantanopia) that is likely to impede driving performance; and • After consideration of the nature of any	

Country	Reference	Color vision	Diplopia	Glare	Night driving	Stereo-vision and depth perception	VA	VF	General
							Driver Licensing Authority, taking into account the opinion of an ophthalmologist or optometrist, and the nature of the driving task, and subject to periodic review: • If the person's vision is worse than 6/18 in the worse eye, provided that the VA in the better eye in 6/9 or better, and • After consideration of the nature of any underlying disorder. 23.3.5 Special consideration. There may be a degree of flexibility allowed at the optometrist's or ophthalmologist's discretion for individuals who barely meet visual standards but who are otherwise alert, have normal reaction times and good muscular coordination. In such cases the Driver Licensing Authority may consider a conditional license.	underlying disorder.	
United Kingdom	At a glance Guide to the current Medical Standards of Fitness to Drive (for Medical Practitioners) Issued by Drivers Medical Group. DVLA, Swansea (February 2007)	If color blind, you need not notify DVLA. Driving may continue with no restriction on license.	Permanent refusal or revocation if insuperable diplopia. Patching is not acceptable.		Night blindness: Group 2 acuity and field standards must be met. Cases will be considered on an individual basis.		New applicants are barred in law if the VA, using corrective lenses if necessary, is worse than 6/9 in the better eye or 6/12 in the other eye. Also, the uncorrected acuity in the eye must be at least 3/60. Note: If obtained first Group 2 license between 02.03.1992 and 31.12.1996 uncorrected VA may be worse than 3/60 in one eye.	Normal binocular field of vision is required, i.e., any area of defect in a single eye is totally compensated for by the field of the other eye.	
New Zealand	Medical aspects of fitness to	Color Blindness:	Generally,	Practitioners should	Night blindness: A		Minimum combined VA of	For all license classes, the	

Country	Reference	Color vision	Diplopia	Glare	Night driving	Stereo-vision and depth perception	VA	VF	General
	drive: A Guide for Medical Practitioners. Land Transport Safety Authority. (May 2002)	Generally, no driving restrictions. However, individuals with color vision problems should be warned of the potential hazards.	considered unfit to drive. In exceptional circumstances, the Director or the Director's delegate may consider granting a license if application is supported by an optometrist or ophthalmologist report.	note that glare may be disabling in some instances, e.g., where a cataract is present, following some refractive surgical procedures, and for some contact lens wearers. In such cases, practitioners should take appropriate action which may include recommending the condition of daytime driving only.	license is unlikely to be granted. In exceptional circumstances, the Director or the Director's delegate may consider granting a license if application is supported by an optometrist or ophthalmologist report.		6/9, with or without correcting lenses. If the worse eye is less than 6/18 but better than 6/60 the applicant is to be classified as having sub-standard vision in one eye. If an individual does not meet this VA standard, they may apply to the Director of Land Transport Safety Authority for an exemption from the standards but a supporting medical or optometric assessment would be needed.	minimum standard is a binocular horizontal field of 140 degrees. There should be no significant pathological field defect encroaching within 20 degrees of the point of fixation.	
India	Delhi Traffic Police New Delhi, India Driver's Check www.delhitrafficpolice.nic.in	A person is unfit to drive if he has color blindness.			A person is unfit to drive if he has night blindness.		A person is unfit to drive if he has a visual impairment.		Pre-existing vision disturbances can be the grounds to reject a license to the commercial vehicles.
South Africa	Regulation 102 (replacing Regulation 241) www.saoa.co.za/projects/driver.php						Minimum VA, with or without refractive correction, of 6/9 (20/30) for each eye	Minimum VF of 70 degrees temporal in respect of each eye, with or without refractive correction.	
Ireland	Irish Statute Book S.I. No. 340/1986 – Road Traffic (Licensing of Drivers) (Amendment) (No.2) Regulations, 1986 Eighth Schedule		Fitness to drive shall not be certified if, on examination, it is found that the applicant has diplopia				Binocular vision with a VA (with corrective lenses, where necessary) of at least 0.75 (6/8) in the better eye and of at least 0.5 (6/12) in the worse eye; if corrective lenses are used, the uncorrected vision must be not less than 0.1 (6.60) and the correction must be tolerated	Fitness to drive shall not be certified if, on examination, it is found that the applicant has a restricted field of vision	
Sweden	Swedish National Road Administration Statute Book Effective 1/1/99		There must be no double vision when looking in any direction.		Total night blindness or any other serious limitation in vision where lighting is reduced constitutes grounds for denial		With or without correction, be at least 0.8 in the better eye and at least 0.5 in the weaker eye. In the case of nystagmus, the level of VA shall be attained when moving the eyes 30° to the left and	Normal in both eyes. A visual defect in one eye does not constitute grounds for denial of possession if the defect is limited in extent and depth and if the reduction is totally compensated by	

Country	Reference	Color vision	Diplopia	Glare	Night driving	Stereo-vision and depth perception	VA	VF	General
					of possession.		right while continuing to face straight ahead. If the acuity specified cannot be attained without corrective glass, neither of the lenses is to have a strength exceeding eight dioptres in the meridian with the highest refraction. This does not apply if vision is corrected with contact lenses that can be used without inconvenience.	the other eye.	

Recommended Revisions to European Union Hearing Standards

Fitness guidelines for commercial drivers in the European Union are set forth in Annex III of Council Directive 91/439/EEC. The Eyesight Working Group was established, in March 2004, by the European License Driving Committee with the intention to provide recommendations to the visual guidelines proposed in the Annex. In 2005, a report titled "New standards for the visual functions of drivers" provided the recommendations listed in Table 5.

Table 5 Recommendations for New Standards for the Visual Functions of Drivers

Topic	Current EU Standard	Problem	Recommendation
VA	At least 0.8 in the best eye, 0.5 in the fellow eye	1) the VA requirement for the fellow eye is insufficiently justified. 2) The cut-off value of 0.8 in the better eye is arbitrary, although we consider it reasonable in Group 2 drivers to expect that the VA is normal or near normal.	1) change the VA in the fellow eye from 0.5 to 0.1 2) recommend no change to the standard of 0.8 in the better eye
VFs	Normal VFs should be present in both eyes	The extent of the VF is dependent upon the shape of one's face, thus a 'normal' VF for one person would not be similar to another.	Formulate the VF requirements in terms of numbers, e.g. horizontal VF should be 160 degrees, the extension should be less than 70 degrees left and right and 30 degrees up and down. No defects should be present within central 30 degrees (not even the Physiologic Blind Spot).
Night Vision	No standards are included	Night vision may provide useful information about driving capacity.	Future introduction of requirements for twilight vision should be made possible and anticipated, after proper research has been performed. It is reasonable to expect unimpaired contrast sensitivity in a Group 2 driver.

*Source of information for Australia: http://www.austroads.com.au/aftd/index.html

†Source of information for Canada: http://www.cma.ca/index.cfm/ci_id/18223/la_id/1.htm

‡Source of information for the United Kingdom: http://www.dvla.gov.uk/medical.aspx?keywords=medical

**Source of information for New Zealand: http://www.landtransport.govt.nz/licensing/docs/ltsa-medical-aspects.pdf

††Source of information for Sweden: http://www.vv.se/filer/4796/9889eng000915.pdf

Regulatory Vision Standards for the U.S.

Individuals operating a CMV for the purposes of intrastate commerce are subject to Federal vision regulatory guidelines set forth in 391.41 (b)(10). Intrastate vision guidelines (Table 6) are established for those individuals driving within state borders and whose cargo remains within state lines.

Distinct policies set forth by individual states include:

- **Wisconsin:** If a person has uncorrected or corrected *VA of less than 20/60* in each eye, but 20/100 or better in one eye, and can demonstrate adequate compensation, a *restricted license* may be issued
- **Kentucky**: If a commercial driver has a distance *VA of 20/60* (Snellen) or better with corrective lenses in one eye or both eyes, he/she may be considered for a *medical waiver*
- **Maryland, Texas and Utah:** Three of only five states that incorporate *color vision* in intrastate guidelines
- **Minnesota:** To obtain a waiver, an applicant must have a *VF of 105 degrees or greater* in the horizontal diameter
- **Massachusetts:** If an individual has a combined horizontal peripheral *field of vision of not less than 120 degrees*, provided they also have a distant VA of 20/40 (Snellen) in either eye, with or without corrective lenses, and the ability to distinguish colors they may be issued a vision waiver
- **Utah:** Intrastate drivers are profiled by their functional ability to drive. An individual profiled at level 2 or 3 qualifies for intrastate travel

Table 6 Medical Standards for Vision Disorders for CMV Drivers by U.S. State

State	Reference	Color Vision	Diplopia	VA	VF	General
Alabama	Alabama Department of Public Safety Motor Carrier Safety Unit/FAQ www.dps.state.al.us/public/highwaypatrol					Please refer to Federal Regulations 391.45 for persons who must be medically examined and certified. Please refer to Federal Regulations 391.43 for guidelines on obtaining a medical card.
Alaska	Title 2 Administration Chapter 90 Driver Licensing and Safety Responsibility Article 6 Standards for Licensing of Drivers 2 AAC.90.440 Medical Standards	The department will not issue A commercial driver license (CDL) to a person unable to meet the color vision standards defined by 49 CFR 391, Subpart E, revised as of October 1, 2005		A CDL will not be issued to a person whose best corrections in both eyes together is less than 20/40	A CDL will not be issued to a person wearing telescopic or compound lenses whose field of vision is less than 70%	The department will not issue a CDL to a person with a progressive eye disease or condition
Arizona	Arizona State Legislature Chapter 8 Motor Vehicle Driver Licensing Article 5 Commercial Driver Licensing 28-3223. Original applicant; requirements; expiration; renewal examination					A. In addition to the requirements applicable to all driver license applicants, an original applicant for a class A, B or C license is subject to the following requirements: 1. The applicant shall submit evidence of compliance with medical standards and requirements that the department adopts by rule.
	Article 4 General Licensing Provisions 28-3159. Restricted licenses					A. With good cause, the department may issue the following restricted driver license: 2. A class A, B or C driver license that restricts the driver from operating: (b) a vehicle in interstate commerce, if the applicant is not subject to 49 Code of Regulations part 391
	Arizona Driver License Manual and Customer Service Guide Motor Vehicle Division D.O.T. Medical Examination Report Commercial Driver Fitness Determination			At least 20/40 acuity (Snellen) in each eye with or without correction.	At least 70° peripheral in horizontal meridian measured in each eye.	
Arkansas	Arkansas Code Title 27. Transportation Chapter 16. Driver's Licenses Generally 27-16.704. Examinations of			Minimum uncorrected 20/40 for unrestricted and minimum corrected of 20/50 for a restricted license	At least 140° for a person with two functional eyes and at least 105° for a person with one functional eye	

State	Reference	Color Vision	Diplopia	VA	VF	General
	applicants					
California	Department of Motor Vehicles Medical Report for Commercial Driver License (CDL) www.dmv.ca.gov/commercial/commercial.htm					A medical form completed by a U.S. licensed doctor of medicine (M.D.), osteopathy (D.O.), licensed physician assistant (P.A.), a nurse practitioner (N.P.), advance practice nurse, or chiropractor who is clinically competent to perform the medical examination, must be given to the DMV with your original application for a driver license or instruction permit. The medical form must be dated within the last 2 years and on a form approved by the Federal Highway Administration, the Federal Aviation Administration, DMV, or on the DMV Report of Medical Examination Report form DL 51 (examiners asked to refer to Federal Regulations 49 C.F.R. 391.41).
Colorado	Revised statutes					No mention of medical qualifications
	Division of Motor Vehicles Motor Carrier Services/Forms DOT Medical Form (CDL Drivers)					Medical Examination Report for Commercial Driver Fitness Determination. No additional explanation is listed.
Connecticut	Department of Motor Vehicles www.ct.gov Obtaining a Commercial Driver's License/Documents required when appearing for CDL Knowledge testing					Physical examination by a physician dated within the last two years, reported on an Examination to Determine Physical Condition of Driver (form R-323) or a U.S. D.O.T. Medical Examiner's Physical Examination Form CO730, which meets D.O.T. requirements in 49 C.F.R. 391.41-391.49.
	Connecticut Code Title 14 – Motor Vehicles Chapter 246/Section 14-44E					Sec 14-44E. Limitations on issuance of commercial driver's license. Qualification standards. Waiver of skills test. Requirements for license endorsement to operate vehicle transporting hazardous materials. Commercial driver's instruction permit. (b) The commissioner shall not issue a commercial driver's license to any person who has a physical or psychobehavioral impairment that affects such person's ability to operate a commercial motor vehicle safely. In determining whether to issue a commercial driver's license in any individual case, the commissioner shall apply the standards set forth in 49 C.F.R 391.41, as amended, unless it is established that the person will operate such vehicle only in this state, in which case the commissioner shall apply the standards set forth in this chapter and in regulations adopted thereunder.

State	Reference	Color Vision	Diplopia	VA	VF	General
Delaware	Delaware Code Title 21 Motor Vehicles Chapter 47. Motor Carrier Safety-Responsibility					4702. Adoption of federal requirements – In general. (a) The State hereby adopts the following parts of the Code of Federal Regulations, Title 49, Chapter III, Subchapter B, except as modified by this chapter:.. Part 391..adopted pursuant to the Transportation Article of the United States Code (49 U.S.C. §101 et seq.).
	Chapter 220 Formerly Bill No. 156 As Amended by Senate Amendment No.1					Section 1. Amend Section 4704(b) [Effective September 30,2005] of Title 21 of the Delaware Code by deleting said subsection in its entirety and substituting in lieu thereof a new subsection (b) to read as follows: (b) Intra-State Only Restricted Commercial Driver License Medical Waiver Program. Persons who are not physically qualified to drive a commercial motor vehicle per 49 C.F.R. Section 391.41 may apply for an intra-State only restricted commercial driver license waiver provided they are otherwise qualified to drive a motor vehicle, other than a motor vehicle which requires endorsements to transport passengers or hazardous materials, and meet the other provisions of this subsection, Title 21 and the Federal Motor Carrier Regulations….The Division will establish policy to administer the CDL medical waiver program. The applicant must provide recent physical examinations signed by the driver's primary physician and, if appropriate, from a medical specialist. The Division may require the applicant to successfully complete a training course and evaluation by a physical rehabilitation center. The Division may refer individual applications to the Medical Advisory Board for their advice concerning the applicant's ability to safely operate motor vehicles weighing more than 26,000 pounds…A "K" restriction will be added to the CDL driver license once a medical waiver is granted. The CDL medical waiver expires on the CDL expiration date or upon a date determined by the Division. Once an applicant is initially granted a CDL medical waiver, the Division may issue a 90-day temporary CDL medical waiver pending the results of medical or rehabilitation examinations. Section 2. Amend Section 4704 [Effective September 30, 2005] of Title 21 of the Delaware Code by adding a new subsection (c) to read as follows: "State, county and local government employees who hold a commercial driver license and operate commercial motor vehicles as defined by §2603(6) as part of their official duties for the State or any political subdivision therein, shall meet the Federal physical qualifications and examination requirements found in 49 C.F.R. Part 391, Subsection E unless approved by an intra-State only restricted commercial driver license in accordance with Section 4704(b).

State	Reference	Color Vision	Diplopia	VA	VF	General
	Commercial Driver's Manual Delaware – Version 2.0					Basic CDL License Requirements: Able to obtain Medical certification under the Federal Motor Carrier Safety Regulations (Part 391.41 – Physical Qualifications for Drivers) If you do not meet part 391.41 Physical Qualifications for Drivers, you may be able to obtain a Delaware intrastate only restricted CDL medical waiver, if otherwise qualified to drive a motor vehicle (excluding transporting passengers or hazardous materials)
District of Columbia	District of Columbia Municipal Regulations Title 18 Vehicle and Traffic Chapter 13: Classification and Issuance of Commercial Driver's Licenses www.dmv.dc.gov					1327.4 A licensed ophthalmologist or optometrist may perform so much of the medical examination as pertains to VA, field of vision, and the ability to recognize colors as specified in §1327.2 (as pertains to 49 CFR 391)
Florida	2006 Florida Statutes Title XXIII Motor Vehicles Chapter 322 Drivers' Licenses					322.12 Examination of applicants. (4) The examination for an applicant for a CDL shall include a test of the applicant's eyesight given by a driver's license examiner designated by the department or by a licensed ophthalmologist, optometrist, physician…
Georgia	Georgia Department of Driver Services Commercial Driver's License Rules Chapter 1 Commercial Driver's Licensing Requirements www.dds.ga.gov	Ability to recognize the colors of traffic signals and devices showing standard red, green, and amber		At least 20/40 in each eye without corrective lenses or VA separately corrected to 20/40 or better with corrective lenses; distant binocular acuity of at least 20/40 in both eyes	At least 70 degrees in the horizontal meridian in each eye	1-1-.04 Minimum Physical Requirements Required to Obtain a Commercial Driver's License. Amended. (2) Applicants for a CDL shall have a distant VA of at least 20/40 in each eye without corrective lenses or VA separately corrected to 20/40 or better with corrective lenses; distant binocular acuity of at least 20/40 in both eyes; or without corrective lenses, field of vision of at least 70 degrees in the horizontal meridian in each eye; and the ability to recognize the colors of traffic signals and devices showing standard red, green, and amber. 1-1-.05 Exemptions from Medical Requirements. Operators of city, county, state or federal vehicles are exempt from the medical requirements. Drivers who operate on an occasional basis receive no compensation and are not involved in commercial enterprise.
	Georgia Code – Motor Vehicles & Traffic Title 40, Section 40-5-147					(2) an applicant for the commercial driver's instruction permit must pass the vision test for the type of vehicle he intends to operate

State	Reference	Color Vision	Diplopia	VA	VF	General
	Georgia Department of Driver Services Application for Georgia Commercial Driver's License					Part 4. Medical Certification Medical Qualifications: Unless specifically exempted, you must possess a valid medical examiner's certificate in order to operate a commercial motor vehicle (49 CFR § 391.41). Government employees (e.g., federal, state, county, or city employees) while operating government owned vehicles are exempt from this medical requirement
	Georgia Department of Driver Services Forms and Manuals					Medical Examination Report for Commercial Driver Fitness Determination with accompanying 49 CFR 391.41 available
Hawaii	Hawaii Revised Statutes Title 17 Motor and other Vehicles Chapter 286 Highway Safety Part XIII Commercial Driver Licensing					§ 286-236 Commercial driver's license qualification standards. (a) No person shall be issued a commercial driver's license unless that person meets the qualification standards of 49 Code of Federal Regulations, Part 391, Subparts B and E….. (e) A commercial driver's instruction permit may be issued to an individual who holds a valid driver's license, meets the qualification standards of 49 Code of Federal Regulations, Part 391, Subparts B and E, and has passed the written tests required for the desired class of a commercial driver's license.
Idaho	Commercial Driver's License Manual Idaho 2007 itd.idaho.gov/dmv/driverservices/cdl_manual					1.4 How to Get a CDL You will be asked if you are subject to and in compliance with the requirements of Part 391 of the Federal Motor Carrier Safety Regulations (Qualifications of Drivers). These include the DOT medical card requirements. Information regarding who is subject to these requirements may be found in Section 13 of this manual. Section 13: Forms/General Qualifications of Driver Requirements Unless exempt, every person who operates a commercial motor vehicle in interstate, foreign or intrastate commerce is subject to the Qualifications of Driver Requirements. (Refer to Federal Motor Carrier Safety Regulations, 49 CFR 391.11 for exact wording) B. An individual is qualified to drive a commercial vehicle if he/she: 4. Carries a current medical examiner's certificate (DOT medical card) stating that he/she is physically qualified to drive a commercial vehicle. (391 Subpart E)
	Idaho Administrative Code IDAPA 11.13.01 Motor Carrier Rules					019. Carrier Safety Requirements 01. Adoption of Federal Regulations. Adoption of Federal Regulations 49 CFR Parts….and 390 through 399 are hereby adopted by reference. Whenever any one (1) of these federal regulations (except Section 391.11(b)(1) exempts intrastate

State	Reference	Color Vision	Diplopia	VA	VF	General
						carriers from any of their requirements, this Rule at IDAPA 11.13.01, "The Motor Carrier Rules", Section 019, removes that exemption and subjects the intrastate carrier to the same requirements. a. All interstate and foreign carriers and intrastate carriers, except those carriers listed in Subsection 019.01.b., subject to the safety authority of the Idaho State Police while operating in Idaho that transport passengers or property, must comply with 49 CFR Parts…and 390 through 399, and the law and rules of the state of Idaho (except 391.11(b)(1) for intrastate carriers). b. Intrastate carriers operating commercial motor vehicles transporting property with a GVW, GVWR, GCW or GCWR greater than ten thousand (10,000) pounds and up to twenty-six thousand (26,000) pounds, subject to the authority of the Idaho State Police, must comply with 49 CFR part 390 Subpart A, Part 391.15, Parts 392, 393, and Part 396.1, 396.3(a), (a)(1), and (a)(2), and 396.5 through 396.9 and the law and rules of the state of Idaho.
Illinois	Illinois Administrative Code Title 92 Transportation Chapter 1: Department of Transportation Subchapter D: Motor Carrier Safety Regulations Part 391: Qualification of Drivers					Section 391.2000 Incorporation by Reference of 49 CFR 391 (c) The following interpretations of, additions to and deletions from 49 CFR 391 shall apply for purposes of this Part. 3) Paragraph (b)(10) (minimum VA) of 49 CFR 391.41 shall not apply to the driver of a commercial motor vehicle with a gross vehicle weight rating or gross combination weight of over 12,000 lbs., used in the intrastate transportation of property who immediately prior to July 29, 1986 was eligible and licensed to operate a motor vehicle subject to the Illinois Motor Carrier Safety Regulations (IMCSR) and was engaged in operating such vehicles, and who was disqualified on July 29, 1986 by the adoption of 49 CFR 391 by reason of the application of paragraph (b)(10) of 49 CFR 391.41 with respect to a physical condition existing at that time unless such driver has a record of accidents which would indicate a lack of ability to operate a motor vehicle in a safe manner (Section 18b-105 of the Law) 4) Paragraph (b)(10) of 49 CFR 391.41 shall not apply to a commercial motor vehicle which either has a gross vehicle weight rating (GVWR) or gross combination weight rating (GCWR) of between 10,000 and 12,001 pounds; or which has a GVWR or GCWR of less than 12,001 pounds and transports hazardous materials in a quantity requiring placarding under the Illinois Hazardous Materials Transportation Act. The vehicle must be used in intrastate transportation. The driver must have been eligible and licensed to operate a motor vehicle subject to the IMCSR and engaged in operating such vehicle immediately prior to January 17, 1992. The driver must have been disqualified on January 17, 1992 by the adoption of Public Act

State	Reference	Color Vision	Diplopia	VA	VF	General
						87-829 which made the IMCSR applicable to vehicles described above. The reason for disqualification must have been the application of paragraph (b)(10) of 49 CFR 391.41 with respect to a physical condition existing at that time. This exception does not apply to any driver who has a record of accidents which would indicate a lack of ability to operate a motor vehicle in a safe manner.
	Illinois Commercial Driver's License Study Guide cyberdriveillinois.com					Federal Motor Carrier Safety Regulations are listed in Table C, pgs 131-132
Indiana	Indiana Administrative Code Title 140 Article 7 Driver's License Division					**Rule 3. Commercial Driver's Licensing** **140 IAC 7-3-1 Definitions** (h) "VA screening" means an eye screening given by the bureau to applicants for a CDL which must be passed in accordance with the standards utilized by the bureau for other types of driver's licenses. **140 IAC 7-3-5 Learner's permit** Sec. 5 (a) Any person who is a resident of Indiana may apply for a commercial driver's license learner's permit. The applicant must (3) Meet all visual and physical examination requirements **140 IAC 7-3-6 Physical examination requirements** Sec. 6. Every applicant or holder of a commercial driver's license must pass a physical examination described as follows: (1) For interstate operation, a physical examination as described by the United States Department of Transportation, 49 C.F.R. 391.43. (2) For intrastate operation, a physical examination as prescribed by the bureau.
	Indiana Department of Revenue Motor Carrier Services Division Commercial Driver's License Section					IDOR Physical Examination Instructions and Information for Physical Examination Forms of CDL Holders
Iowa	Iowa Administrative Code 2000 Chapter 607 CDL					**761-607.26(321) Vision screening** An applicant for a CDL must pass a vision screening test administered by the department. The vision standards are given in 761-604.11 (321). This rule is intended to implement Iowa

State	Reference	Color Vision	Diplopia	VA	VF	General
						Code sections 321.186 and 321.186A.
	Iowa Administrative Code IAC 1/8/92, 2/11/98 761-604.11 (321) 604.11(1) VA standards 604.11(2) Field of vision standards This rule is intended to implement Iowa Code sections 321.186, 321.193, and 321.196			*a. When the applicant is screened without corrective lenses.* If the VA is 20/40 or better with both eyes or with the better eye, no restriction will be imposed. If the VA is less than 20/40 but at least 20/50 with both eyes or with the better eye, the applicant shall be restricted to driving when headlights are not required. If the VA if less than 20/50 but at least 20/70 with both eyes or with the better eye, the applicant shall be restricted to driving when headlights are not required and restricted to a maximum speed of 35 m.p.h. *b. When the applicant is screened with corrective lenses.* If the VA is 20/40 or better with both eyes or with the better eye, applicant shall be required to wear corrective lenses. If the VA is less than 20/40 but at least 20/50 with both eyes or with the better eye, the applicant shall be required to wear corrective lenses and shall be restricted to driving when headlights are not required. If the VA is less than 20/50 but at least 20/70 with both eyes or with the better eye, the applicant shall be required to wear corrective lenses, restricted to driving	*a.* if the binocular field of vision is at least 140 degrees, no restrictions will be imposed. *b.* if the binocular field of vision is less than 140 degrees but at least 115 degrees and one eye has a monocular field of vision of at least 70 degrees temporal and 45 degrees nasal, the applicant shall be restricted to driving a vehicle with both left and right outside rearview mirrors.	

State	Reference	Color Vision	Diplopia	VA	VF	General
				when headlights are not required, and restricted to a maximum speed of 35 m.p.h. *c. Other standards.* If the VA in the left eye is less than 20/100, the applicant shall be restricted to driving a vehicle with a left outside rearview mirror. However, if the applicant has a VA of 20/40 in the right eye and less than 20/100 in the left eye without corrective lenses and has corrective lenses that improve the vision in the left eye to better than 20/100, the applicant shall have the option of being restricted to driving with corrective lenses or driving a vehicle with a left outside rearview mirror.		
	Iowa Code Section 321.449 Motor Carrier Safety Rules					1. A person shall not operate a commercial vehicle on the highways of this state except in compliance with rules adopted by the department under chapter 17A. The rules shall be consistent with the federal motor carrier safety regulations promulgated under United States Code, Title 49, and found in 49 CF.R. pts. 390 – 399 and adopted under chapter 17A. 5.a.Notwithstanding other provisions of this section, rules adopted under this section concerning physical and medical qualifications for drivers of commercial vehicles engaged in intrastate commerce shall not be construed as disqualifying any individual who was employed as a driver of commercial vehicles engaged in intrastate commerce whose physical or medical condition existed prior to July 29, 1996.
Kansas	Motor Carrier Regulations of the Transportation Division of The State Corporation Commission of The State of Kansas June 30, 2006					**82-4-6d. Waiver of physical requirements**. (a) Any person failing to meet the requirements of 49 C.F.R. 391.41 may be permitted to drive a vehicle, other than a vehicle transporting passengers, if the director finds that the granting of a waiver is consistent with highway safety and the public interest. (2) The application shall be accompanied by the following: (ii) Letters of recommendation regarding vision impairments

State	Reference	Color Vision	Diplopia	VA	VF	General
						shall be provided by a licensed ophthalmologist or optometrist who treated the driver applicant. (g) All intrastate vision waiver recipients shall be subject to the following conditions: (1) each driver shall be physically examined every year by the following individuals (A) A licensed ophthalmologist or optometrist who attests that the vision in the better eye continues to meet the standard set forth in 49 C.F.R. 391.41(b)(10); and (B) a licensed medical practitioner who attests that the individual is otherwise physically qualified under the standards set forth in 49 C.F.R. 391.41. (2) Each driver shall provide a copy of the ophthalmologists, or optometrists, report to the medical practitioner at the time of the annual medical examination.
Kentucky	Kentucky Legislature Kentucky Administrative Regulation Title 601 Transportation Cabinet Department of Vehicle Regulation	To be considered for a medical waiver, the commercial driver shall readily distinguish which light of traffic signals and devices showing standard red, green and amber is illuminated.	To be considered for a medical waiver, the commercial driver shall not have uncorrectable double vision.	To be considered for a medical waiver, the commercial driver shall have a distance VA of 20/60 (Snellen) or better with corrective lenses in one (1) or both eyes.	To be considered for a medical waiver, the commercial driver shall have horizontal VFs which are not narrowed to less than 110 degrees of total VF.	**601 KAR 11:040 Medical waivers for intrastate operators of commercial motor vehicles** NECESSITY, FUNCTION, AND CONFORMITY: The federal requirements for the issuance of a commercial driver's license to a driver operating in interstate commerce include a certification that the driver meets the qualification requirements contained in 49 C.F.R. 391. The Federal Highway Administration does not require a person who operates entirely in intrastate commerce to be subject to 49 C.F.R. 391. He is subject, however to Kentucky driver qualification requirements in 601 KAR 1:005 the Transportation Cabinet adopted the majority of the driver qualification requirements of 49 C.F.R. Part 391 on both an interstate and intrastate commerce basis. However, medical waivers in addition to those allowed in 49 C.F.R. 391.49 are allowed by the Federal Highway Administration for drivers operating exclusively in intrastate commerce. This administrative regulation sets forth the procedure and standards for obtaining an intrastate medical waiver. **Section 1. Application for Intrastate Medical Waiver.** (4)(a) Except as provided in paragraph (b) of this subsection, a copy of the applicable supplemental medical report form shall be completed by a licensed doctor or medicine or osteopathy. (b) The "Vision Conditions" form shall be completed by a licensed doctor of optometry or ophthalmology. The **Section 2.** (2) The following medical guidelines shall be considered by the Division of Driver Licensing in evaluating the information related to the commercial driver: (b) Vision. To be considered for a medical waiver, the commercial driver shall:

State	Reference	Color Vision	Diplopia	VA	VF	General
						1. Have a distance VA of 20/60 (Snellen) or better with corrective lenses in one (1) or both eyes; 2. Have horizontal VFs which are not narrowed to less than 110 degrees of total VF; 3. Readily distinguish which light of traffic signals and devices showing standard red, green and amber is illuminated; 4. Not wear bioptic lenses; and 5. Not have uncorrectable double vision.
Louisiana	Louisiana Office of Motor Vehicles Web01.dps.louisiana.gov					FMCSA medical forms available
	Louisiana Revised Statutes Title 32 Motor Vehicles and Traffic Regulation					§403.4 Medical evaluation report required of persons driving a commercial motor vehicle A. A person applying for a Class "A", "B", or "C" commercial driver's license shall not have any physical or mental disability affecting the ability to exercise ordinary reasonable control in the operation of a commercial motor vehicle. Such person, unless exempted by the office of motor vehicles or by a rule or regulation, shall provide a current medical report, on a form approved by the office of motor vehicles, prepared by a duly licensed medical examiner, certifying that he is capable of exercising ordinary reasonable control in the operation of a commercial motor vehicle. Such person shall submit a valid medical report at every renewal and shall carry a current medical certificate on his person at all times when driving a commercial motor vehicle requiring either a Class "A", "B", or "C" commercial driver's license as defined herein.
Maine	Maine Commercial Driver License Manual			Minimum VA is a distance rating of 20/40 with best eye. If you cannot attain the 20/40 VA reading, the examiner will refer you to an eye doctor of your choice for a visual examination.	At least 140 degrees in order to avoid being restricted to left and right outside mirrors. If you cannot attain the field of vision of less than 110 degrees, the examiner will refer you to an eye doctor of your choice for a visual examination.	No permit will be issued until you present a properly completed doctor referral form to show the visual requirements have been met. If you meet the visual requirements with glasses or contact lenses, the permit and operator's license will be restricted to corrective lenses.
Maryland	Maryland Motor Vehicle Administration maryland.mva.com/resource/DL-171 Maryland Motor Vehicle Administration	Must be able to distinguish red, green and amber		20/40 each eye (corrected or uncorrected)	Peripheral – at least 70 degrees each eye (110 degrees continuous)	Medical Examination Report for Commercial Driver Fitness Determination available CDL Medical Waiver Information Packet Requesting Interstate Waiver/Exemption/Requesting Intrastate Waiver **1. General**

State	Reference	Color Vision	Diplopia	VA	VF	General
	Maryland.mva.com/resources/CDLwaive					B. The MVA may issue an intrastate waiver, which covers the following physical/medical conditions listed below. Vision B. The MVA may issue an intrastate waiver, which covers the following combined physical/medical conditions: No other combinations will be waived. • Vision and amputation or loss of limb • Vision and power grasping or prehension **3. Intrastate Waivers** Individuals who do not meet the physical requirements of §391.41(b)(10) and cannot obtain a FMCSA waiver or exemption may apply for an intrastate waiver, which is issued by the Motor Vehicle Administration. An intrastate waiver restricts the individual to driving a commercial motor vehicle within Maryland. B. Examination of Individuals Applying for Vision Intrastate Waiver Individuals who do not meet the physical requirements in §391.41(b)(10) must submit a physical examination form performed by a licensed medical examiner. Minimum vision requirements for commercial licenses are: • See standards noted under Color Vision, VA and VF
	Annotated Code of Maryland .06 49 CFR 391, Qualifications of Drivers – Amendments and Exemptions					E.49 CFR§391.41(b). (1) an intrastate driver ..who does not meet the physical qualifications of 49 CFR §391.41 (b) may drive in intrastate commerce if issued a waiver for intrastate operation by the Administrator. The waiver is valid for up to 2 years from the date of issue.
Massachusetts	Massachusetts Registry of Motor Vehicles Application for Intrastate Medical Waivers	See waiver conditions		See waiver conditions	See waiver conditions	The Registrar may issue an intrastate waiver for the following conditions only: a. A Vision Impairment if: the individual has a combined horizontal peripheral field of vision of not less than 120 degrees, provided the individual also has a distant VA of at least 20/40 (Snellen) in either eye, with or without corrective lenses, and the ability to distinguish the colors red, green, and amber
	Massachusetts Registry of Motor Vehicles					Medical Examination Report for Commercial Driver Fitness Determination available

State	Reference	Color Vision	Diplopia	VA	VF	General
	Massachusetts Registry of Motor Vehicles Intrastate Medical Waiver Policy Statement for Commercial Motor Vehicle License Classes A, B, and C as of June 16, 1998					The Registry of Motor Vehicles will waive compliance with the federal requirements pertaining to commercial motor vehicles for the purposes of driving intrastate only (within the borders of Massachusetts only) and will issue intrastate medical waivers for the following conditions only, provided the Registrar determines that the condition, in an individual case, will not interfere with the safe operation of a commercial motor vehicle. 1. Vision Impairment (see application for conditions)
Michigan	Michigan Department of State michigan.gov Michigan Code Chapter 480 Motor Carrier Safety					Medical Examination Report for Commercial Driver Fitness Determination available 480.13; Section 3. (2) A person who is not physically qualified to drive under 49 CFR 391.41 and who is otherwise qualified to drive a commercial motor vehicle may drive a commercial motor vehicle if the motor carrier division of the department of state police or the appeal board has granted a waiver to that person.
Minnesota	Minnesota/Department of Transportation Office of Freight and Commercial Vehicle Operations Minnesota Trucking Regulations					Section 06 Physical Qualifications for Drivers (49 CFR §391.41 and 391.43) A person is not allowed to drive a commercial motor vehicle unless physically qualified to do so and carries in his or her possession a current, valid copy of a medical examiner's certificate (health card) showing he or she is qualified. In general, a person is physically qualified if he or she: Has a VA of at least 20/40 in each eye, with or without corrective lenses Section 07 Minnesota Intrastate Driver Waivers The Minnesota Department of Transportation may issue a waiver to drivers who cannot meet the minimum physical qualifications as established in the Driver Qualification Rules 49 CFR part 391 and Minn. Stat. Chapter 221 Waiver programs available to Minnesota intrastate drivers include vision
	Minnesota/Department of Transportation Office of Freight and Commercial Vehicle Operations Minnesota Commercial Truck and Passenger Regulations Fact Sheet Vision Waiver			To obtain a waiver, an applicant must have a VA of at least 20/40 (Snellen), corrected or uncorrected, in the better eye of an applicant	To obtain a waiver, an applicant must have a VF of 105 degrees or greater in the horizontal diameter with either one usable eye or with both eyes	

State	Reference	Color Vision	Diplopia	VA	VF	General
Mississippi	Senate Bill 3042 2007 Regular Session This act shall take effect and be in force from and after July 1, 2007.					An act to amend sections 77-7-7 and 77-7-716, Mississippi Code of 1972, to exempt certain vehicles from regulation under the Mississippi motor carrier regulatory law of 1938; to provide that the state enacts the exemption allowed under federal regulations for intrastate commerce; and for related purposes. Section 3. Notwithstanding the provisions of this chapter to the contrary, Parts 390 through 397, Title 49, Code of Federal Regulations, shall not apply to commercial motor vehicles operated in intrastate commerce to transport property which have a gross vehicle weight rating or gross combination weight rating of twenty-six thousand (26,000) pounds or less.
Missouri	Missouri Motor Carrier Services Missouri Department of Transportation Medical Program					Medical Examination Report for Commercial Driver Fitness Determination available Exemptions: MoDOT can grant a medical exemption for intrastate commercial drivers **by issuing a Skill Performance Evaluation** certificate if the individual meets alternate standards which satisfy the department that the applicant can safely operate a commercial vehicle. MoDOT can only issue SPE Certificates to applicants, who **are not physically qualified because of vision impairment.** SPEC-2 Form for applicants with Impaired Vision and Medical Evaluation Summary is available online. No specific standards are noted only guidelines for examination.
Montana	Montana Department of Transportation Motor Carrier Services Division 2003-2005 Law Book Effective October 1, 2003					61-5-112. Types and classes of commercial driver's licenses – classification – rulemaking – reciprocity agreements. (1) The department shall adopt rules that it considers necessary for the safety and welfare of the traveling public governing the classification of commercial driver's licenses and related endorsements and the examination of commercial driver's license applicants and renewal applicants. The rules must: (a) subject to the exceptions provided in this section, comport with the requirements of 49 CFR, part 383, and the medical qualifications of 49 CFR, part 391 (b) Allow for the issuance of a type 2 (intrastate only) commercial driver's license in accordance with medical qualification and VA standards prescribed by the department.

State	Reference	Color Vision	Diplopia	VA	VF	General
	2005 Commercial Driver's Manual Montana Rules and Regulations			At least 20/40 (best corrected) in either eye		"Exemption" to Physical Qualifications If the Interstate driver cannot meet the DOT requirements, but they can meet the Montana medical requirements, they will be issued a Montana medical card allowing them to drive in the State of Montana only. Drivers must meet the medical qualifications for a Commercial Drivers License (CDL): 12. A CDL driver must have at least 20/40 vision (best corrected) in each eye. *(Interstate CDL)* 13. However, a driver may be able to obtain an Intrastate CDL if they have at least 20/40 vision (best corrected) in either eye. *(Intrastate CDL)*
Nebraska	Nebraska Administrative Code Title 291 – Nebraska Public Service Commission Chapter 3 – Motor Carrier Rules and Regulations	Ability to distinguish colors of red, green, and yellow		At least 20/40 (Snellen) in each eye either without glasses or by correction with glasses	In the horizontal meridian of not less than a total of 140 degrees	005 Safety Regulations 005.01 Minimum Qualifications 005.01B: see guidelines listed under color vision, VA and VF
	Nebraska Revised Statutes					**Section 60-4,146** Application; operation on intrastate commerce; certification; restrictions. (1) Upon making applications pursuant to section 60-4, 144, any applicant who operates or expects to operate a commercial motor vehicle solely in intrastate commerce and who is not subject to 49 C.F.R. part 391 adopted pursuant to section 75-363 shall certify that he or she is not subject to 49 C.F.R. part 391. Any applicant making certification pursuant to this section shall meet the physical and vision requirements established in section 60-4,118 **60-4,118 Vision requirements; persons with physical impairments; physical or mental incompetence; prohibited act; penalty** (1) No operator's license shall be granted to any applicant until such applicant satisfied such applicant satisfies the examiner that he or she possesses sufficient powers of eyesight…The Department of Motor Vehicles, with the advice of the Health Advisory Board, shall adopt and promulgate rules and regulations: (a) Requiring a minimum acuity level of vision. Such level may be obtained through the use of standard eyeglasses, contact lenses, or bioptic or telescopic lenses which are specially constructed vision correction devices which include a lens system attached to or used in conjunction with a carrier lens; (b) Requiring a minimum field of vision. Such field of vision may

State	Reference	Color Vision	Diplopia	VA	VF	General
						be obtained through standard eyeglasses, contact lenses, or the carrier lens of the bioptic or telescopic lenses.
Nevada	Nevada Revised Statutes					**NRS 483.330** Examination of applicants; waiver of examination by Department. 1. The Department may require every applicant for a driver's license, including a commercial driver's license issued pursuant to NRS 483.900 to 483.940, inclusive, to submit to an examination. The examination may include:(d) Except as otherwise provided in subsection 3, an actual demonstration of his ability to exercise ordinary and reasonable control in the operation of a motor vehicle of the type or class of vehicle for which he is to be licensed. The examination may also include such further physical and mental examination as the Department finds necessary to determine the applicant's fitness to drive a motor vehicle safely upon the highways.
	Nevada Administrative Code			At least 20/40, corrected or uncorrected, in at least one eye if the applicant suffers from a visual deficiency		NAC 483.803 **Waiver of certain physical requirements: Submission and contents of application.** (NRS 483.908) A person who is not physically qualified to operate a commercial motor vehicle pursuant to 49 C.F.R. § 391.41, but who is otherwise qualified to operate a commercial motor vehicle, may apply to the Department for a waiver of the physical requirements with which he does not comply. NAC 483.8031 Prerequisites for waiver of certain physical requirements 1. An applicant for a waiver of one or more of the physical requirements described in 49 C.F.R. § 391.41 must submit to the Department with his application: (c) A medical evaluation signed by a physician or optometrist if the applicant suffers from a visual impairment. The medical evaluation must: (1) Identify and describe the visual impairment of the applicant; (2) Indicate whether the applicant's condition is stable or progressive; (3) Certify that the applicant is able to operate a commercial motor vehicle; (4) Certify that the vision of applicant is at least 20/40, corrected or uncorrected, in at least one eye if the applicant suffers from a visual deficiency

State	Reference	Color Vision	Diplopia	VA	VF	General
New Hampshire	State of New Hampshire Office of Legislative Services Administrative Rules/Department of Safety Chapter Saf-C 1800 Commercial Driver Licensing Saf-C 1004.02 Pass. No Restrictions. Saf-C 1004.03 Pass. Corrective Lenses Restriction.			Each applicant shall pass the VA exam if the applicant: (1) accurately perceives the line of symbols designated 20/40 with both eyes; or (2) Is legally blind in one eye and accurately perceives the line of symbols designated 20/30 with the other eye. (b) For the purposes of this section, "accurately perceives" means determining the symbols presented with no more than one error. (Saf-C 1004.02) Each applicant who meets the standards set forth in Saf-C 1004.02 with the use of corrective lenses shall pass the VA examination subject to the corrective lenses restriction pursuant to RSA 263:13 and Saf-C 1008.03 (Saf-C 1004.03)		**Part Saf-C 1804. Original CDL and Endorsements: Examinations Required** (a) Each applicant for an original CDL or endorsements, unless otherwise provided in these rules, shall satisfactorily complete the following: (1) The VA examination set forth in Saf-C 1004 Part Saf-C 909 Medical Waiver **Saf-C 909.02 Waiver** A person who is not physically qualified to drive due to having physical deficiency, as listed in 49 CFR 391.41(b)(1)-(13), but who is qualified to drive a commercial motor vehicle pursuant to 49 CFR 391.11 and has not been disqualified pursuant to 49 CFR 391.15, shall be authorized to drive a commercial motor vehicle if the commissioner grants a waiver pursuant to Saf-C 909.09. **Saf-C 909.07 Contents of a Medical Evaluation Summary** Each driver-applicant, who is not physically qualified pursuant to 49 CFR 391.41(b), shall obtain a medical evaluation summary, … from a medical examiner, who has expertise with the driver-applicant's specific medical condition (e) Each driver applicant who is not physically qualified pursuant to 49 CFR 391.41(b)(3)-(13) shall obtain a medical evaluation summary that includes the following: (1) Whether the impairment interferes with the driver-applicants ability to perform normal tasks associated with driving a commercial motor vehicle; (2) An assessment and medical opinion of whether the condition is likely to remain medically stable for the duration of the medical waiver; and (3) A recommendation as to the period of time the medical waiver shall be valid, not to exceed 2 years.
New Jersey	State of New Jersey Motor Vehicle Commission/Commercial	Able to recognize red, green and amber colors		20/40 vision in each eye (with or without glasses/corrective lenses)		**39:3019.11 Definitions relative to commercial driver licenses.** "Disqualification" means either: (b) A determination by the Federal Motor Carrier Safety Administration under the rules of practice for motor carrier safety contained in 49 C.F.R.s386, that a person is no longer qualified to operate a commercial motor vehicle under 49 C.F.R. 391
New Mexico	New Mexico Statutes					**66-5-60. Commercial driver's license; qualifications; standards**. The division shall not issue a commercial driver's license to a person unless that person is a resident of New Mexico and has passed a knowledge test and skills test for driving a commercial

State	Reference	Color Vision	Diplopia	VA	VF	General
						motor vehicle and for related endorsements, has passed a fitness test and has satisfied any other requirements of the New Mexico Commercial Driver's License Act [66-5-52 NMSA 1978] **65-3-7 Qualifications of drivers** C. The driver may adopt regulations pertaining to the qualification and disqualification of commercial motor carrier vehicle drivers including documentation thereof. The regulations shall include but not be limited to background and character, road testing and written examination, physical qualification, examination and waivers of certain physical defects.
New York	New York State Department of Motor Vehicles Federal Requirements for Commercial Driver License (CDL) Applicants					Informs first-time CDL applicants about federal medical requirements
	Commercial Driver License (CDL) Certifications					When you apply for an original NYS Commercial Driver License (Class A, B or C) or a renewal, you must certify that: You meet or do not meet, the requirements of the Federal regulations in 49 CFR Part 391, which include a requirement for a medical examination. 49 CFR Part 391 Certification The federal regulations include a requirement that a commercial driver have a medical examination every 2 years and receive a Medical Examiner's Certificate.
	New York State Commercial Driver's Manual					1.3 Commercial Driver License Requirements 1.3.4 Medical Requirement The federal government requires most CMV drivers to have a medical examination in order to detect physical or mental conditions that may affect your ability to operate a motor vehicle safely. The examination requirements are found in the U.S. DOT Federal Motor Carrier Safety Regulations under 49 CFR Part 391. You are exempt from needing a medical examiner's certificate if you: are a government employee at any level of government
North Carolina	North Carolina Department of Transportation Division of Motor Vehicles	Demonstrated ability to distinguish colors that pertain to driving and traffic control		At least 20/40 for each eye and both eyes together; with or without corrective lenses	At least 70 degrees in the horizontal meridian in each eye	Commercial Trucking/License Eligibility/Requirements 6. Medical and Physical Requirements i. Vision (see guidelines listed under color vision, VA and VF)
North Dakota	North Dakota Century Code Article 37-08 Visual Requirements for Operators Licenses or Permits					**37-08-01-05. Minimum vision requirements and restrictions.** Except as provided in ND Century Code section 39-08-21, the driver of a commercial class A,B, or C motor vehicle shall comply with the federal motor carrier regulations, pursuant to 49

State	Reference	Color Vision	Diplopia	VA	VF	General
						CFR section 391.41(b)(10).
	Chapter 39−08 Regulations Governing Operators					**39−08−21. Medical qualifications exemption for intrastate drivers.** Notwithstanding the adoption by the superintendent of the state highway patrol of federal motor carrier safety regulations pursuant to subsection 3 of section 39−21−46, the provisions of 49 CFR 391.41(b)(1)−(11) do not apply to a person who is qualified through a state medical waiver program to operate a commercial motor vehicle within the boundaries of this state or a person who: 1. Is otherwise qualified to operate a commercial motor vehicle and who possesses, on March 26, 1991, a class 1 license issued pursuant to section 39−06−14, as that section existed on June 30, 1989, or a class A license issued pursuant to chapter 39−06.2; 2. Operates a commercial motor vehicle only within the boundaries of this state; and 3. Has a medical or physical condition that: a. Would prevent such person from operating a commercial motor vehicle under federal motor carrier safety regulations contained in 49 CFR, chapter III, subchapter B; b. Existed on March 26, 1991, or at the time of the first required physical examination after that date; and c. An examining physician has determined has not substantially worsened since March 26, 1991, or the time of the first required physical examination after that date
	Commercial Drivers License Guide 2005-2007					Medical Qualifications North Dakota state law requires that if any licensed Class A, B, or C operator suffers permanent loss of damage of an eye, he or she must make a report of explanation to the Drivers License and Traffic Safety Division.
Ohio	Ohio Administrative Code 4501:1-1-20 Vision Standards for driver license applicants			See **(D)**	See **(G)**	**(D)** This paragraph applies to CDL applicants who are not required to meet the standards of 49 C.F.R. 391. (1)(a) Persons with binocular vision whose VA is 20/40 or better, without corrective lenses, shall be issued a license restricted to intrastate operation of commercial motor vehicles (CMV). (b) Persons with binocular vision whose combined VA is poorer than twenty/forty but not worse than twenty/sixty shall be issued a license restricted to daytime driving only. (c) Persons with binocular vision unable to attain a combined VA of at least twenty/sixty shall be denied a license. (2)(a) Persons with monocular vision whose VA is twenty/thirty or better, without corrective lenses, shall be issued a license without visual restriction. (b) Persons with monocular vision whose VA is poorer than

State	Reference	Color Vision	Diplopia	VA	VF	General
						twenty/thirty but not worse than twenty/sixty shall be issued a license restricted to daytime driving. (c) Persons with monocular vision unable to attain acuity of at least twenty/sixty shall be denied a license. **(G)** This paragraph contains horizontal-peripheral vision standards for CDL applicants who are not required to meet the standards of 49 C.F.R. 391. (1) A person possessing a seventy-degree VF on both sides of the fixation point shall be issued a non-restricted license. (2) If the VF on one side of fixation is less than seventy degrees the applicant shall be tested and must demonstrate a VF of at least seventy degrees on one side of fixation an forty-five degrees on the other side of fixation, and the applicant is subject to a restricted license and the use of an outside mirror on the side of the more limited VF, in addition to an inside mirror, and an applicant for a CDL shall be restricted to intrastate operation of commercial vehicles. (3) A person who does not demonstrate a VF of at least seventy degrees on one side of fixation and forty-five degrees on the other side of fixation shall not be issued a license. (4) Anyone who does not meet VF standards of seventy degrees on one side and forty-five degrees on the other side, will be referred to an ophthalmologist or a licensed optometrist for further examination.
Oklahoma	Oklahoma Commercial Driver's Manual Section 1.8 Federal and State Qualifications for Commercial Motor Vehicle Drivers www.dps.state.ok.us	Ability to recognize the colors of traffic signals and devices showing standard red, green, and amber		At least 20/40 (Snellen) in each eye without corrective lenses or VA separately corrected 20/40 (Snellen) or better with corrective lenses, distant binocular acuity of at least 20/40 (Snellen) in both eyes with or without corrective lenses	At least 70 degrees in the horizontal meridian of each eye	
	Oklahoma Administration Rules Title 595/Department of Public Safety Chapter 10 Driver License and Identification Cards Subchapter 3 - Examination					595:10-3-6. Vision (d) VA and field of vision – Class A, B, or C CDL applicants who are exempt from 49 C.F.R., §391.41(b)(10), if the applicant meets the vision standards established in OAC 595:10-5-7 (a)(2) and 595:10-5-7(b)(2)

State	Reference	Color Vision	Diplopia	VA	VF	General
	Oklahoma Administration Rules Title 595/Department of Public Safety Chapter 10 Driver License and Identification Cards Subchapter 5 – Medical Aspects					595:10-5-7. Vision standards and problems (a) Acuity (2) A person may be considered for a Class A,B, or C intrastate commercial driver license if the VA in one eye alone or with both eyes is twenty-forty (20/40) or better, with or without corrective lenses. (b) Field of vision (2) A person may be considered for a Class A, B, or C intrastate CDL if the field of vision is at least seventy (70) degrees in the horizontal meridian in one eye alone.
Oregon	Oregon Administrative Rule					735-074-0260 Medical Standards for Drivers of Commercial Motor Vehicles (1) The Driver and Motor Vehicle Services Division of the Department of Transportation (DMV) adopts the United States Department of Transportation regulations contained in 49 CFR 391.41 through 391.49 (2004) pertaining to physical qualifications and medical examination of drivers of commercial motor vehicles. (2) DMV may issue a Class A, B, or C commercial driver license to a person who does not qualify for a medical certificate under section (1) of this rule if the person is issued: (a) a waiver of physical disqualification by the Motor Carrier Transportation Division of the Oregon Department of Transportation (MCTD) under OAR 740-100-0104
	Oregon ODOT/DMV					Physical Qualifications Physical qualifications are listed in CFR 49 § 391.41. If you do not meet these physical qualifications due to vision limitations and want to operate a CMV interstate, you may be able to satisfy alternative physical qualifications or qualify for an exemption. If you cannot meet the medical qualifications for interstate CMV operation, you may qualify for a Waiver of Physical Disqualification available from ODOT, Motor Carrier Transportation Division. Such a waiver would permit operation of a CMV within the State of Oregon only.
	Oregon 2006-2007 Commercial Driver License Manual					Physical Examination A medical waiver may be issued for some otherwise disqualifying conditions, but a medical waiver issued by ODOT is good for no more than two years. It applies only to intrastate drivers.
	Oregon Statutes					740-100-0140 Oregon Waiver of Physical Disqualification (3) Explains waiver conditions and procedures

State	Reference	Color Vision	Diplopia	VA	VF	General
Pennsylvania	PA Public Utility Commission Motor Carrier Services and Enforcement Division					Safety Fitness Review Program Educational and Technical Assistance Package Part 391 – Qualifications of Drivers Motor Carriers must ensure that all drivers meet the Physical Qualifications and Examinations required in Part 391.41 and possess a valid medical certificate.
Rhode island	Rules and Regulations Governing Applicants for Commercial Driver's Licenses, Permits, Renewals and Endorsements Adopted 2007 Department of Revenue/Division of Motor Vehicles					Rule 3. Minimum Eligibility for Commercial Driver's License, Permit or Endorsement 3.2 At the time of submitting the application, the applicant must be physically qualified to safely operate a commercial motor vehicle. In making this determination, the Division of Motor Vehicles shall follow applicable federal guidelines contained in 49 C.F.R. § 391.41 and may seek recommendations from the Medical Advisory Board pursuant to Section 31-10-44 of the Rhode Island General Laws.
	Rhode Island Code					§ 31-10.3-19 – Examination of Applicants (a) the department shall examine every applicant for a commercial driver's license. The examination shall include (1) a test of the applicant's eyesight to be administered according to standards set by the Federal Motor Carrier Regulations
South Carolina	Commercial Motor Vehicle Manual					Transfer of Commercial Driver's License To transfer a CDL from another state to SC: 2) Certify you have read and understand and meet the qualifications requirements under 49 CFR, Part 39 of the FMCSRs. You must also show a valid DOT physical card or long form.
South Dakota	South Dakota Code 49					49-28A-3 Adoption of federal regulations—Violation as misdemeanor. The state hereby adopts Title 49 of the Code of Federal Regulations, subtitle B, chapter III, subchapter B, parts 390 to 397, inclusive as amended through January 1, 2006, with the following modifications: Intrastate drivers are exempt from the physical requirements of part 391.41
Tennessee	Rules of TN Department of Safety Division of Driver License Issuance Chapter 1340-Classified and Commercial Drivers Licenses and Certificates for Driving			If 20/40 of better, right eye and left eye – No restrictions unless corrective lenses are needed to achieve VA. If 20/40 or better one eye – Corrective lenses restriction if applicable.		**Chapter 1340-1-13.10 Vision Standards** (1) Applicants for CDL shall pass a vision test with the minimum qualifications as specified in 49 C.F.R. §391 unless they are exempted from meeting federal physical and mental standards by 1340-1-13.09. If exempt, they shall meet the general vision standards set forth below. (see guidelines listed under VA)

State	Reference	Color Vision	Diplopia	VA	VF	General
				If 20/60 to blind other eye – Restricted to outside rear-view mirrors. If 20/60 or better, right eye and left eye – Outside rear-view mirrors and corrective lenses restriction if applicable.		
Texas	Texas Administrative Code Title 37 Public Safety and Corrections Part 1 Texas Dept of Public Safety Chapter 16 Commercial Drivers License Subchapter A Licensing Requirements, Qualifications, Restrictions, and Endorsements	Ability to recognize the colors of traffic signals and devices showing standard red, green, and amber		20/40 (Snellen) or better distant VA with corrective lenses in the better eye; OR the applicant's vision is uncorrectable in one eye and the applicant does not wear corrective lenses, then uncorrected vision must be at least 20/25 (Snellen) in the better eye		**Rule 16.9 Qualifications to Drive in Intrastate Commerce** (a) Persons who do not qualify in intrastate commerce may still qualify to drive in intrastate commerce. In such cases, the commercial driver's license (CDL) will contain an "M" restriction.. (3) An applicant may present the department's vision waiver certificate in lieu of meeting the vision requirements of Title 49, Code of Federal Regulations, Part 391.41. Waivers issued by the department may be renewed through the License Issuance Bureau of the department in Austin. (5) A driver who operates a CMV in intrastate commerce only may obtain a vision waiver provided the following qualifications are met: (only one waiver can be used to obtain a CDL) **(A) Vision Waiver requirements:** **(see guidelines listed under Color Vision and VA)** (9) applicants for a Texas Intrastate Vision Waiver must be able to meet all other physical requirements specified in 49 CFR, Part 391.41 without the benefit of any other waiver. **Rule 16.8 Qualifications to Drive in Interstate Commerce** (4) The applicant must meet the federal vision requirements set out in 49 Code of Federal Regulations, Part 391.41. or have been issued an exemption. Note: Vision waivers issued by the department are valid for intrastate operations only as stated in §16.9 of this title (see above)
Utah	Utah Department of Public Safety Driver License Division Functional Ability in Driving: Guidelines and Standards for Health Care Professionals	**See information listed under Category I: VA/Commercial**	**See information listed under Category I: VA/Commercial**	**See information listed under Category I: VA/Commercial**	**See information listed under Category I: VA/Commercial**	**Application of Commercial Intrastate Medical Standards** The 2006 Functional Ability in Driving: Guidelines and Standards for Health Care Professionals has outlined the medical standards as applying to ALL commercial intrastate drivers, irrespective of the type of vehicle or cargo involved, i.e., Class A, B, C, and D of Utah's Classified License System. (2) Commercial Intrastate Drivers must be profiled in the appropriate categories in order to be considered for an intrastate license. (3) Also, pursuant to Utah Code Annotated 53-3-303.5 an intrastate driver is no longer able, or required to carry a Federal DOT card. The intrastate only (K) restriction is sufficient to indicate the driver has met the State of Utah medical guidelines

State	Reference	Color Vision	Diplopia	VA	VF	General
						for the commercial license he/she will hold. **Category I: VA/Commercial** **Profile Level 1** *Central VA*: 20/40 or better in each eye *Peripheral VFs:* Monocular - 120° in each eye. Binocular - 70° to the right and to the left in the horizontal meridian. *Color Vision:* Normal *Interval for Review:* N/A *License Class & Restrictions:* Commercial Unlimited **Profile Level 2** *Central VA:* 20/40 or better in better eye *Peripheral VFs:* Monocular - 120° in each eye. Binocular - 60° to the right and left in the horizontal meridian. *Color Vision:* Normal *Interval for Review:* 2 years *License Class & Restrictions:* Commercial Intrastate **Profile Level 3** *Central VA:* 20/40 or better in better eye *Peripheral VFs:* Binocular -120° total, 60° to both the right and left. Or, in patients with impaired VFs in one eye, a VF in the better eye or 120° total, with 60° of field to both the right and to the left *Color Vision:* Normal *Interval for Review:* 2 years *License Class & Restrictions:* Commercial Intrastate. Requires prior commercial vehicle experience documentation and MAB approval. **Profile Level 4** *Central VA:* 20/40 or better in better eye *Peripheral VFs:* Binocular VF – at least 90° total with at least 45° to both the right and left. Or, in patients with impaired VFs in one eye, a VF in the better eye of 90° total, with 45° of field to both the right and to the left *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 5** *Central VA:* 20/50 to 20/70 in better eye *Peripheral VFs:* Binocular VF – at least 90° total with at least 45° to both the right and left. Or, in patients with impaired VFs in one eye, a VF in the better eye of 90° total, with 45° of field to

State	Reference	Color Vision	Diplopia	VA	VF	General
						both the right and to the left *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 6** *Central VA:* 20/80 to 20/100 in better eye *Peripheral VFs:* Binocular VF – at least 60° total with at least 30° to the right and left. Or, in patients with impaired VFs in one eye, a VF in the better eye of 60° total, with 30° of field to both the right and to the left *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 7** *Central VA:* Special circumstances not covered by any of the above *Peripheral VFs:* Binocular VF – at least 60° total with at least 30° to the right and left. Or, in patients with impaired VFs in one eye, a VF in the better eye of 60° total, with 30° of field to both the right and to the left *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 8** *Central VA:*20/40 or better in better eye *Peripheral VFs:* Binocular VF – at least 60° total with at least 30° to the right. (Includes left hononymous defects) *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 9** *Central VA:* 20/40 or better in better eye *Peripheral VFs:* Binocular VF – at least 60° total with at least 30° to the left. (Includes right hononymous defects) *Color Vision:* Not required *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Profile Level 10** *Central VA:* 20/200 or worse *Peripheral VFs:* Binocular VF less than 60°

State	Reference	Color Vision	Diplopia	VA	VF	General
						Color Vision: N/A *Interval for Review:* N/A *License Class & Restrictions:* No commercial driving **Aspects of Licensing and Medical Certification of Commercial Intrastate Drivers** In general, a profile of 2, 3, and 4, depending on the category, may qualify the applicant for a commercial intrastate license. Because of the greater responsibilities involved, this program will differ from the usual licensing procedures for private vehicle drivers: (3) Recognition of red, green and amber used in traffic lights may be tested with simple color cards, rather than more complex test devices. (4) For commercial intrastate licensing, the health care professional will be expected to mark all categories upon initial examination repeating this process every two years depending on the medical condition and profile level registered at the time of the examination.
Vermont	Vermont Statutes Title 23 Motor Vehicles Chapter 39: Commercial Driver License Act					4110. Application for commercial driver license (A) for an applicant who operates or expects to operate in interstate or foreign commerce or who is otherwise subject to 49 C.F.R. part 391, the applicant meets the qualifications requirements contained in part 391; or operates or expects to operate entirely in intrastate commerce and who is not subject to part 391, that the applicant is subject to state driver qualification requirements and is not subject to part 391
	Department of Motor Vehicles CDL Manual					Physical Examination Requirements If you are subject to the Federal Motor Carrier Safety Regulations, you must have a physical examination every 2 years and carry the medical card at all times. To have a hazardous materials endorsement, you must meet the Federal Motor Carrier Safety regulations except for age requirements for intrastate travel.
Virginia	Commonwealth of Virginia Department of Motor Vehicles Vision Screening/Commercial Driver's License www.dmv.state.va.us			20/40 or better vision in each eye. Commercial drivers with only one eye must meet these requirements: 20/40 or better vision in one eye	140 degrees or better, horizontal vision. Commercial drivers with only one eye must meet these requirements: 120 degrees, or better, horizontal vision	.

State	Reference	Color Vision	Diplopia	VA	VF	General
	Virginia Code 46.2-341.9. Eligibility for CDL					No person should be eligible for a VA CDL until he has applied for such license and has passed the applicable vision test
Washington	WA State Licensing: Commercial Driver Fitness Determination					**1.3 Medical Waivers** All commercial drivers must meet the medical standards established by federal and state laws, rules, and regulations. Reference: FMCSR parts 391.41 and 391.49 Intrastate If you don't meet the medical standards, you can apply to the Department of Licensing (DOL) for an Intrastate Medical Waiver. This waiver is : Valid for operation within the state of Washington only Valid for no more than a two-year cycle Medical Waiver Drivers with the following conditions may be eligible to apply for an intrastate waiver: A condition of monocular vision
West Virginia	Commercial Driver's Manual					Age and Fitness Requirements Federal Motor Carrier Regulations (49 CFR Part 391.41) require that drivers subject to those rules meet specific physical qualification standards and carry evidence of such qualification in the form of a medical certificate. Note: all drivers are subject to FMSCR requirements (DOT medical) except for city, county, state or federal employees which would require an eye examination.
Wisconsin	Department of Transportation Chapter Trans 112 Medical Standards for Driver Licensing and General Standards for School Bus Endorsements			At least 20/60 or better in at least one eye as assessed by a vision specialist	A horizontal, temporal field of vision of 70° or more from center in at least one eye	Trans 112.14 Conditions affecting sensory function. (3)(a) *Licensing standards.* No endorsement or license may be issued to, renewed by, or held by a person who does not meet the medical review standards for conditions affecting sensory functions of this subsection. (b) *Corrective lenses.* A person needing corrective lenses to meet the standards in this section shall be restricted to use of those lenses while driving. No person may use a bioptic telescopic or similar lens in order to meet the VA standards of this subsection if the lens reduces the field of vision below the standards in this subsection. (d) *Medical standards for CDL.* A person who applies for, renews, or holds a CDL shall meet all of the following criteria: 1. VA of at least 20/60 or better in at least one eye as assessed by a vision specialist. 2. A horizontal, temporal field of vision of 70° or more from center in at least one eye.

State	Reference	Color Vision	Diplopia	VA	VF	General
						(e) Medical standards for all classes of operator licenses. A person, who applies for, renews, or holds for any classification of operator's license shall meet all of the following criteria: 1. If a person has uncorrected or corrected VA of less than 20/40 in each eye, but at least 20/60 in one eye, the department shall refer the person to a vision specialist for an examination and an advisory recommendation. The person shall complete a driving evaluation as recommended by the vision specialist. The person's license shall be assigned restrictions based upon a recommendation from the vision specialist or the results of a driving evaluation demonstrating adequate compensation for the loss of vision. 2. If a person has uncorrected or corrected VA of less than 20/60 in each eye, but 20/100 or better in one eye, the department shall refer the person to a vision specialist for examination and an advisory recommendation. The person shall complete a driving evaluation. The person's license shall be assigned restrictions, based upon a recommendation from the vision specialist and the results of a driving evaluation demonstrating adequate compensation for the loss of vision. 3. If a person has a horizontal, temporal field of vision of less than 70° from center in one eye and 70° or more from center in the other eye, the person's license shall be restricted to driving with an outside rear view mirror to compensate for the loss of field of vision. A person restricted to driving with a right outside rear view mirror may have this restriction waived based on a driving evaluation demonstrating adequate compensation for the loss of field of vision. 4. If a person has horizontal, temporal field of vision of less than 70° from center in each eye, the person shall be referred to a vision specialist for an examination and an advisory recommendation. The person shall complete a driving evaluation. The person's license shall be restricted to driving with outside rear view mirrors to compensate for the loss of field of vision. The person's license may be subject to additional license restrictions, but these may be waived based on a recommendation from a vision specialist and a driving evaluation demonstrating adequate compensation for the loss of field of vision. (g) *Special restricted operator's license*. 1. No persons with VA of 20/200 or less in the better corrected eye, as certified by a vision specialist, may be issued a special restricted operator's license. 2. Person's applying for or holding a special restricted operator's license with VA between 20/100 and 20/200, but not including 20/200 in the better corrected eye, as certified by a vision

State	Reference	Color Vision	Diplopia	VA	VF	General
						specialist, shall be restricted to daylight hours of operation only.
Wyoming	Wyoming Statutes Title 31 Motor Vehicles Article 3 Commercial Driver's License					31-7-304. Issuance; classifications and endorsements. (f) Before issuing or renewing a commercial driver's license, the department shall require that the applicant present a current federal medical qualification certificate.