



Color Blind

ISSUES FOR THE INSPECTION/INSPECTOR/CERTIFICATION

BY

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Purpose

- ▶ Awareness of Color Blindness (CB), what it actually is.
- ▶ Discuss why we test for Color Blindness.
- ▶ Suggest a successful practical exam may remove the need for the Color Blindness exam.
- ▶ Review possible relatively new inexpensive treatments.
- ▶ Should NAS410 be aligned to what is said in ATA Spec 105?
- ▶ Create feedback.
- ▶ Address in 2021 ASNT SNT-TC-1A.

Introduction

- ▶ What does Color Blind (CB) mean to the 90%+ normal vision world?
- ▶ Is the inspector Color Blind or Color Deficit (CD)?
- ▶ The 5 W's and How for CB/CD.
- ▶ Should we test for it, what if we didn't test for it, what risk?
- ▶ Can we treat CB/CD?
- ▶ Would we accept certain forms of correction?
- ▶ Summary/Conclusion

What is Color Blindness?

- ▶ Most of us share a common color vision sensory experience. Some people, however, have a color vision deficiency, which means their perception of colors is different from what most of us see.
- ▶ Color blindness could be considered a bit of a misleading term, because there are very few people who can't see color at all. Some may be blind to some shades of color, but not all.
- ▶ Very few, less than 1/1,000,000 are completely CB.
- ▶ The verified complete CB cases have many other health issues

Color Blind or Color Deficient

- ▶ Basically, when we talk about color deficiency or color blindness, we're talking about people who cannot tell the difference between certain colors, or, in extreme cases, can't see the color at all, which would be true color blindness.
- ▶ Vast majority of research states that color deficiency is genetically linked. The most common statistic is probably about 8% of males or 1 in 12, and about 1 in 200 women.
- ▶ The genetic link is passed down by the mother

Genetic Link

- ▶ The Color Deficiency is caused by abnormal photopigments. These color-detecting molecules are located in cone-shaped cells within the retina, called cone cells.
- ▶ The most severe forms of these deficiencies are referred to as color blindness. People with color blindness aren't aware of differences among colors that are obvious to the rest of us.
- ▶ People who don't have the more severe types of color blindness may not even be aware of their condition unless they have been tested.

Non-Genetic

- ▶ Sometimes color blindness can be caused by physical or chemical damage to the eye, the optic nerve, or parts of the brain that process color information. Color vision can also decline with age, most often because of cataract - a clouding and yellowing of the eye's lens.

Genetic Link

- ▶ There are three main kinds of color blindness, based on photopigment defects in the three different kinds of cones that respond to blue, green, and red light. Red-green color blindness is the most common, 5% of males followed by blue-yellow and other cone related color issues, all affect about 1% of males.
- ▶ Link...<http://www.colourblindawareness.org/colour-blindness/causes-of-colour-blindness/>

Deuteranomaly

- ▶ In males with deuteranomaly, the green cone photopigment is abnormal. Yellow and green appear redder and it is difficult to tell violet from blue. This condition is mild and some everyday task may require adapting.
- ▶ Tasks like cooking meat to the desired color or selecting ripe produce can be a challenge. Traffic lights pose challenges, since the red and yellow may prove difficult to determine until the position of the light can be determined. Reading maps or buying clothes that match colors can also be difficult. However, these are relatively minor inconveniences and most people learn to adapt.

Protanomaly:

With protanomaly, the red cone photopigment is abnormal. Red, orange, and yellow appear greener and colors are not as bright.

Protanopia:

With protanopia, there are no working red cone cells. Red appears as black. Certain shades of orange, yellow, and green all appear as yellow.

Deuteranopia

With deuteranopia, there are no working green cone cells. They tend to see reds as brownish-yellow and greens as beige

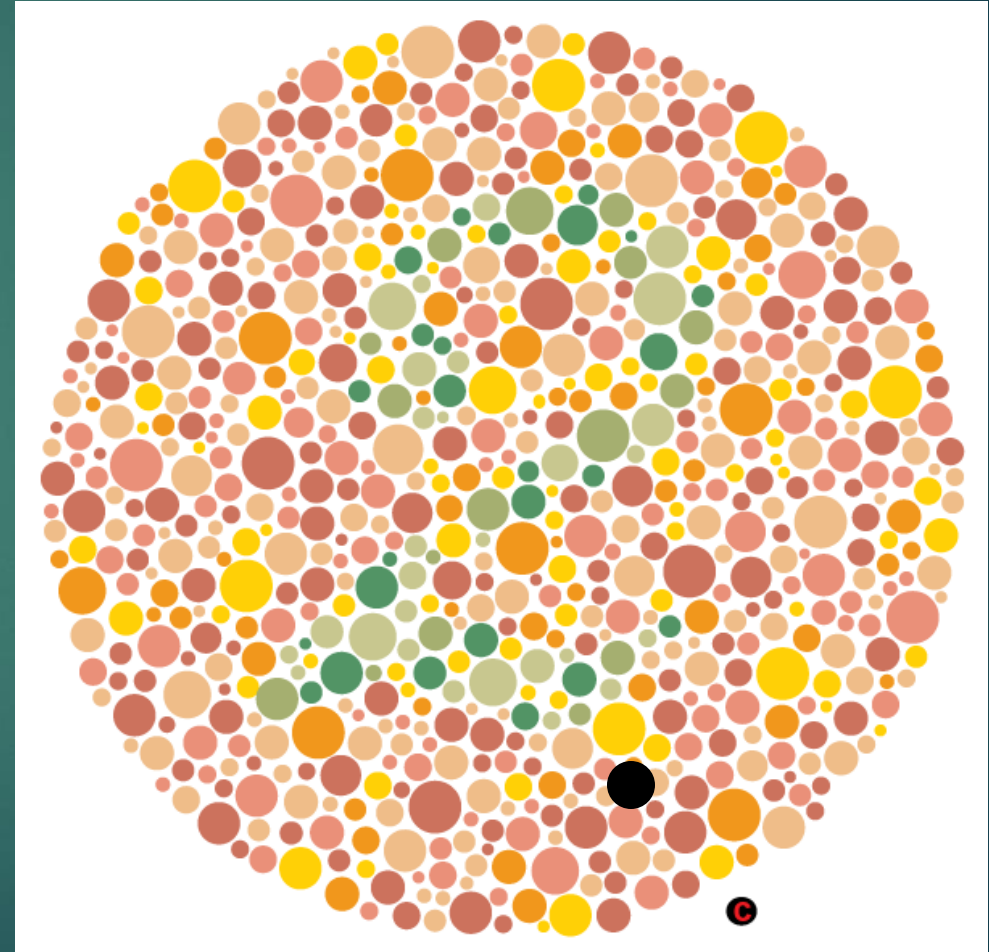
Color Testing



Requirements for Certification

12

- ▶ Color Perception (SNT-TC-1A)
 - ▶ Every 5 years
 - ▶ Demonstrate the capability of distinguishing and differentiating contrast among colors or shades of gray used in the method as determined by the employer



Treatments

- ▶ There is no cure for color blindness. However, people with red-green color blindness have been able to use a special set of lenses to help them perceive colors more accurately. These lenses have become more common and less expensive in cost. These lens can be put into a regular pair of glasses and used, let's try a pair.
- ▶ Visual aids have also been developed to help people cope with color blindness. There are iPhone and iPad apps. Some of these apps allow users to snap a photo and tap it anywhere on the image to see the color of that area. Maybe your socks will match now.

Going forward

- ▶ Should NDT vision standards require a check for color deficiency?
- ▶ NAS410, ATS Spec 105, and ASNT SNT-TC-1A, all handle differently.
- ▶ Why do we even check for it?
- ▶ What would happen if we did not check for it?
- ▶ It is not required for Instructors/auditors in NAS410?
- ▶ It is a one time check in ATS Spec 105?
- ▶ It is verified or limited by a Level III, what if the Level III is CD?

NAS410

7.1.1 Vision

- The vision exam for trainee, Level 1–limited, Level 1, Level 2 and Level 3 personnel shall assure that the applicant's near vision and COLOR PERCEPTION meet the requirements of Table V.
- Vision requirements do not apply to instructors or auditors. COLOR PERCEPTION tests shall be administered at least every 5 years.
- Any limitations in COLOR PERCEPTION shall be evaluated by the Responsible Level 3 prior to certification and must be approved in writing.

TABLE V – VISION REQUIREMENTS

Examination Requirements	
Near Vision Options	• Tumbling E in accordance with ISO 18490 • 20/25 (Snellen) at 16" (40.64 cm)) +/- 1" (2.54 cm)* • Jaeger No. 1 at not less than 12" (30.48 cm) *
Color Perception	Personnel shall be capable of adequately distinguishing and differentiating colors used in the process involved

* In at least one eye, natural or corrected

ATA Spec 105

- ▶ COLOR PERCEPTION- Distinguish and differentiate between colors used in the method for which certification is sought.
- ▶ This can be shown through the Psedoisochromatic Plate (PIP) Test, or Farnsworth Panel D-15 Test, or equivalent test as determined by qualified medical personnel. The Ishihara's Plates are normally accepted.
- ▶ Color vision testing need only be done one-time, at the initial vision examination.
- ▶ Any limitations in COLOR PRECEPTION shall be evaluated by the responsible Level 3 prior to certification and must be approved in writing

Conclusion

- ▶ Should we change any specs
- ▶ Add the corrective lens as an option
- ▶ Discontinue the requirement
- ▶ Fire all of those that are CD
- ▶

Credits and other links for research

- ▶ <http://www.colourblindawareness.org/about-us>
- ▶ <http://www.colourblindawareness.org/>
- ▶ <http://www.colourblindawareness.org/colour-blindness/inherited-colour-vision-deficiency/>
- ▶ Neil Retallic Learning and Development Manager-Vision Express
- ▶ Dr. Tom MacMillan –Optometrist, 23 years of private practice
- ▶ *The National Eye Institute (NEI) is part of the National Institutes of Health (NIH) and is the Federal government's lead agency for vision research that leads to sight-saving treatments and plays a key role in reducing visual impairment and blindness.*