Occupational dispensing

A reference guide to professional advice and solutions for the workplace

Association of British Dispensing Opticians

Occupational dispensing

Introduction

The eye, like all other parts of the body, is unique. From birth, through maturity to old age the eye constantly changes and with these changes come challenges to ensure visual capability, comfort and performance are met. It is widely recognised that the ability to see is one of the most important human senses and as such it is essential to ensure that the health of the eye is monitored on a regular basis. Regardless of age, it is essential that everyone has regular eye examinations, at specified intervals.

Interpretation of spectacle prescriptions is a highly skilled and complex competency. Understanding the complexities of the eye and the needs of the patient in order to achieve the desired outcome is dependent on the skill of the individual undertaking the task. It is therefore advisable for the patient to seek professional advice at all times during the dispensing process.

This guide will consider the necessary requirements of eyesight and eyewear for those in the workplace and in doing so will offer guidance for both corrective and non-corrective situations. It is the intention to cover many areas of workplace situations where specific spectacle dispensing can obtain tangible results.

The eye

The eye is an extremely complex structure which, in conjunction with the brain, provides the sense of sight. It is used in the vast majority of activities we perform allowing us to see, interpret shapes, colours and dimensions of objects in the world around us by processing the light they reflect or emit. It is able to detect bright or dim light, but is unable to sense an object when light is absent.

Visual disorders

When someone has what is best described as 'perfect vision' the eye can be defined as being emmetropic. This would suggest a Snellen visual acuity of 6/6, or better, in each eye with no discernible pathology present. When there is deviation from emmetropia the eye is said to be ametropic, and we come across the following conditions affecting visual performance:

Myopia *(short sight, the eye-ball is too long)* is where rays of light entering the eye focus before they reach the retina. People with myopia see objects more clearly when they are close to the eye, whilst distant objects appear blurred or fuzzy, ie reading and close-up work may be clear, but distance vision is blurry.

Hypermetropia *(long sight, the eye ball is too short)* is where rays of light entering the eye converge to focus beyond the retina. Vision is better for distant objects than those at near.

Presbyopia *(occurs in middle age, due to deterioration of the flexibility of the crystalline lens and efficiency of the ciliary muscles within the eye)* is the loss of the eye's ability to focus on close objects. It is a condition that occurs as a part of the normal ageing process. Presbyopia progresses gradually over a number of years and symptoms are usually noticeable in those aged 40-45.

Factors affecting visual performance

In addition to conditions of the eye which influence visual performance, there are additional factors that are experienced on a daily basis that have a considerable impact on the eye. Many of which can be related to the workplace.

Glare
Different types of glare can affect eyesight in various ways ranging from distracting to disabling. By understanding the effects of glare, appropriate solutions can be employed when dispensing eyewear.

Distracting glare
Distracting glare can be caused by car headlights or streetlights at night. It can also be as simple as light being reflected off the front surface of spectacle lenses, thereby making it difficult for others to see the wearer's eyes. Similarly, it may be from light reflected off the back surface (ie the inner side) of the lenses, so that the spectacle wearer sees the distracting reflection of their own eyes and objects behind them in their forward field of vision. As a result, this kind of glare may cause eye fatigue, annoyance and distraction.

Discomforting glare
Glare can be caused by every day, normal sunlight conditions. Depending upon one's light sensitivity, this glare can be discomforting regardless of weather or time of day. It can be present in any level or intensity of light, or when moving from one lighting condition to another. Discomforting glare often causes 'squinting' and eye fatigue.

Disabling glare
This type of glare comes from excessive, intense light that can occur when facing the sun. Disabling glare can block vision because the intense light can cause significantly reduced contrast of the retinal image. It may come from light reflected off smooth, shiny surfaces such as water, sand or snow. In order to diminish the effects of blinding or reflected glare it is strongly advisable to wear polarising filter lenses to counteract the reflected light.


Reduction of glare
with polarised lenses

Lens types and lens materials

Lens types

The following information relates to the types of lenses and materials most commonly used in optical practice today.

Single vision lenses
A single vision lens has the same focal power across the entire lens surface (except if the lens is aspheric) and can be used to correct myopia, hypermetropia, astigmatism and combinations of the disorders mentioned.

Bifocal lenses
A bifocal lens consists of two parts: the upper part is normally used for distance vision and the lower part (or segment) used for near vision tasks such as reading.

Trifocal lenses
A tri-focal lens is similar to a bifocal with the addition of a third segment generally incorporating intermediate power.

Progressive lenses
A progressive power lens (sometimes called by its old name 'varifocal') has no dividing lines as the focus changes progressively from the upper to the lower portion of the lens to enable visual comfort at all distances; distance, intermediate and reading.

Enhanced reading lenses
An enhanced reading lens provides a greater depth of focus than conventional single vision lenses for reading and offers more flexibility in working distance.

Occupational progressive lenses
Occupational progressive power lens are designed for performing a particular job or hobby however they are not meant for general-purpose wear.

Standard progressive lens

Progressive lens specially adapted for drivers

Lens materials

Hard resin
Hard resin CR39 optical plastic is the most commonly used lens material in the UK today. This is because CR39 offers a good balance of clarity, durability, lightness of weight, scratch-resistance (if hard-coated) and low price.

Trivex
Trivex (also supplied under the brand names of PNX and Trilogy) is thinner, lighter and more impact resistant (similar to polycarbonate) than CR39 with equally good optical properties, UV absorption and chemical stability.

Polycarbonate
Polycarbonate is an extremely high impact material often used in safety spectacles and for children's spectacles. It does, however, have optical disadvantages.

Glass
Glass is used infrequently nowadays although still available for those who have a preference. It should never be used for children or monocular patients or hazardous pursuits. Glass is not compatible with the latest freeform manufacturing techniques.

Standard lens

Enhanced reading lens

The workplace

We will now look at specific areas in the workplace and occupations whereby vision is fundamental to operating effectively.

Driving

In many countries there are specific guidelines relating to vision and driving. Whilst regulations vary on means of testing, it is common for the vision standard to be at least 6/12 on the Snellen chart with both eyes open or in the only eye if monocular. ***In recent times the UK Government has accepted this level of visual acuity as law when driving.****

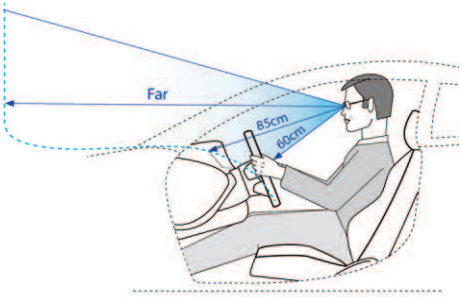
For 'Group 2' drivers eg those individuals who drive large goods vehicles, lorries, busses etc. the vision in the good eye must be at least 6/7.5 and at least 6/60 in the other eye. Where glasses are worn to meet the minimum standards, they should have a corrective power ≤ +8 dioptres. The uncorrected acuity in each eye must be 3/60.

The minimum field of vision for safe driving is defined as a field of at least 120° on the horizontal and the extension should be at least 50° left and right. In addition, there should be no significant defect in the binocular field which encroaches within 20° of fixation above or below the horizontal meridian.

When wearing spectacles for driving, it is highly recommended that users have an anti-reflection coating applied to reduce the effects of glare. Anti-reflection coatings are designed to achieve high transmission in spectacle lenses and eliminate ghosting effects.

With uncoated CR39 lenses approximately 4% transmission per lens surface is lost, resulting in a total reduction in light transmission of approximately 8%. But when CR39 lenses are multi anti-reflection coated a light transmission factor (LTF) of 99% is achieved, ie a loss of only 1%. In the case of uncoated high index lenses, there is an even greater transmission loss per surface, due to reflection; hence most manufacturers apply anti-reflection coating as standard procedure.

Historically, using lightly tinted lenses or yellow contrast enhancing tints for driving were popular, however, as technology has developed it is recommended that the use of anti-reflection coatings offer the best solution for driving at night or in non-sunny environments, to the preclusion of tinting.



** Driver and Vehicle Licensing Agency. Assessing fitness to drive - a guide for medical professionals (2016) is available at http://www.gov.uk/dvla/fitnesstodrive*

Driving and tinting categories

Class	Category	Usage	Tint transmission	Driving restrictions
0	Clear or very light tint	Indoors or overcast	80 - 100%	None
1	Light tint	Light sunlight	43 - 80%	Not suitable for night driving
2	Medium tint	Medium sunlight	18 - 43%	Not suitable for night driving
3	Dark tint	Bright sunlight	8 - 18%	Not suitable for night driving
4	Very dark tint	Exceptionally bright sunlight	Up to 8%	Not suitable for driving

Note: The above categories refer to Plano sunglasses, tinted prescription lenses with a transmission of less than 75% are not suitable for use in twilight or night driving.

Trains

Train drivers will almost certainly be driving in differing climates and light conditions, therefore arrangements should be made to cover all eventualities. In terms of visual acuity, the train driver will be required to have visual acuity of 6/9 in the better eye and 6/12 in the other eye, with near vision acuity of N8. Should any train driver have a colour deficiency they will not be permitted to drive a train. It is recommended that a train driver has a clear pair of spectacles, MAR coated, with an additional pair of tinted lens, whereby for obvious safety reasons colour definition is not compromised.

Pilots

The entry requirements for the aviation pilots require a visual acuity, with spectacles or contact lenses, to be 6/9 in each eye with an ability to see 6/6 binocularly. Additionally there should be no anisometropia or astigmatism of more than 2.00 dioptres. Pilots should carry a spare pair of spectacles at all times.

Sunglasses are an important piece of protective equipment in the cockpit environment. The tint should be neutral in colour, generally grey or brown are acceptable. The tint should be no darker than 80% absorption. It can also be beneficial to consider a graduated tint, whereby the lens is tinted at the top and reducing in depth of tint at the bottom.

Polarised lenses reduce the amount of light passing through the lens by selective filtering of certain electromagnetic spectral planes. These lenses can cause distortion patterns from certain toughened cockpit windshields. Historically these lenses were discouraged

for use by pilots, however there have been advancements in technology whereby the axis of the polarising filter has been specifically controlled to ensure visual recognition is not hindered allowing pilots to use if they so wish.

Light travels in all different directions, oscillating, which causes glare. When a polarised filter is introduced the light oscillates in one direction, p-state light. Polarising filters block or reduce light reflected at certain angles from smooth, non-metallic surfaces such as glass or water, thus reducing the effect of glare to the wearer.

Pilots who require spectacles will almost certainly have specific needs. Whilst it is slightly easier to dispense spectacles to those who require a distance-only prescription the objective is to achieve optimum performance, in this case considering strongly the merits of bi-aspheric designed lenses to give as clear and natural fields of vision as possible. However great care should be taken in dispensing these lenses, as very accurate vertical and horizontal centration is essential.

When we start to deal with those who are presbyopic it can become more complicated. Many will benefit from the use of bifocals and progressive lenses dispensed in a conventional manner although greater consideration must be given to the working distance requirements.

It is not uncommon to find pilots with double segment trifocals allowing them to have pre-set working distances worked into the lenses. This allows a pilot to see at distance, intermediate and near.

Factory workers

Many people such as engineers, processing personnel, cleaners, craftsmen etc. will work in a factory environment. Regardless of the risks associated with the specific job it, is likely that in an industrial environment danger could arise from a number of places and situations, which highlights the need to strongly consider the risks to the eye. In many countries around the world, regulations are in place to ensure that personal protective equipment (PPE), including protective eyewear, is used by all people operating in such workplaces. Protective eyewear can be prescription or non-prescription and come in a variety of options including spectacles, goggles and shields. In terms of 'safety' spectacles, they will have side shields attached to the sides of the frame to avoid any foreign objects entering the eye and surrounding area and it is likely that the lenses supplied will be plastic (thickened CR39), toughened glass

(thermally or chemically), low energy impact materials, or materials such as polycarbonate or Trivex. Full details of requirements relating to safety can be obtained from ABDO publication 'Protective eyewear'

Maintaining correct and comfortable posture is essential to prevent neck and shoulder pains

Office workers

The modern day workforce in offices have become extremely reliant upon the use of computers, with many spending the majority of their working day viewing a screen. Often individuals will benefit from specific spectacles for use with a computer screen, ie VDU spectacles. These can be used in addition to single vision, bifocal or progressive lenses, where working distance is taken into account for the individual's workstation.

In an office environment, whilst working with computers, it is helpful to understand more about ergonomics. Ergonomics is a science concerned with the 'fit' between people and their work. It puts people first, taking account of their capabilities and limitations. Ergonomics aims to make sure that tasks, equipment, information and the environment suit each worker.

When we consider how they eye works we must appreciate that everyone is different, therefore visual capabilities and requirements will alter dependant on the individual worker.

These are some of the issues facing VDU users:

- The screen is poorly positioned - it is too high/low/close/far from the worker, or is offset to one side
- The mouse is placed too far away and requires stretching to use
- Chairs are not properly adjusted to fit the person, forcing awkward and uncomfortable postures
- There is glare on the screen from overhead lights or windows, increasing the risk of eyestrain
- Not enough breaks or changes of activity - prolonged use can lead to staring and potentially dry eyes as a result of insufficient blinking
- The office illumination is unsatisfactory, lighting intensity, incidental light or window position

These problems may result in mistakes and poor productivity, eye strain, headaches, stress and other aches or pains.

When an office worker reaches presbyopia it will become more difficult to fulfil their needs with one pair of spectacles. Generally speaking, it isn't possible to provide bifocals with the expectation of satisfying all the wearer's needs, due to the positioning of the segment, unless the lenses are specifically designed for intermediate and near use. Progressive lenses may achieve favourable results due to the progression from distance through the intermediate corridor to the reading zone. Freeform lenses should be considered, particularly designs that take into account the individual fitting parameters, thereby optimising visual performance. However it should be remembered that most progressive lenses are designed for 'general wear' purposes and offer a limited intermediate area when it comes VDU use. Therefore the use of enhanced reading/occupational progressive lenses (OPALs) should be considered to cater specifically for those using computers for prolonged periods. OPALs meet the ergonomic criteria effectively as they can be ordered to specific working distances and offer increased fields of vision for the required tasks. It is likely that wearers of these lenses will exhibit less head movement than bifocal or progressive lens wearers.

Lens manufacturers have also introduced lenses aimed at those between the ages of approximately 30-45 who often find the effects of extensive computer screen use tiring on the eyes. These lenses are designed in order to reduce the fatigue effects of eye muscles by incorporating a small amount of positive power in the lower portion of the spectacle lens. These lenses are primarily used for everyday tasks involving the computer and concentrated activities. Many who are pre-presbyopic find such lenses particularly helpful for mobile phone use.

Most office environments utilise fluorescent lighting, therefore added UV protection may also need to be considered. Anti-reflection coating is also strongly recommended for lenses used for VDU use.

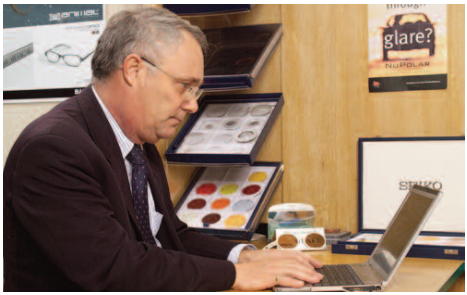
Progressive lenses can be specially created for office workers

Teachers/Lecturers/Presenters

For people who have various visual requirements it can be beneficial to have multiple pairs of spectacles in order to operate effectively. Regarding the role of teachers, lecturers and those who deliver presentations, it is clear that needs vary depending on the task. For example, if prolonged concentration is required to mark students' work it would be advisable to have reading glasses to give a full field of vision at a specified distance, however within the classroom

this will not be suitable. In the classroom teachers are standing most of the time, looking and walking around, leaning over their students to check their work, then writing on the board and also doing close work, therefore distance and near correction will be essential, as well as intermediate for the more mature presbyope. For lesson preparation, intermediate and near correction is required. Progressive lenses should, perhaps, be the first consideration, alternatively there might be a need for enhanced reading and intermediate use with only a small requirement for distance vision. In this situation, an occupational progressive can be considered, with a limited distance performance but offering wide intermediate and/or near zones.

Occupational progressive lenses compliment the use of normal progressives as they are designed specifically for the work environment.



Considering this concept, it could be described loosely as the reverse of that of a conventional progressive lens, as the distance vision has a considerably reduced field whereas the intermediate and reading zones are designed to give wide optimum visual fields; ultimately an ideal pair of spectacles for the work environment that can be interchanged with normal progressive lenses depending on the individual's needs.

Shop workers

Shop workers will have various visual requirements depending on their duties. Many will use tills, pricing equipment, deal with written or printed orders and often computers will be used. Essentially the advice given to the office worker would reflect that given to teachers, though in the office environment a wider distance field would probably be required.

Outdoor activities

Occupations where much of the working day will be spent outdoors will require similar visual considerations to many of the occupations mentioned already. However in this instance the additional factors of light and UV play a major part on final lens selection. For people such as gardeners, traffic wardens, police, road workers etc., additional lens options, such as photochromic lenses, can be considered to ensure visual comfort is achieved. When photochromic lenses are exposed to ultraviolet rays they darken and provide visual comfort in direct sunlight. The depth of tint will vary depending on the extent of the ultraviolet light and the outside temperature, though the latest photochromic materials are much less affected by temperature. The depth of tint fades when moving out of the direct sunlight returning to a pale tint indoors or to almost clear at night. The fact that the wearer can work

without changing spectacles is a distinct benefit. Transitions photochromic lenses are available in Trivex and polycarbonate material if the need for additional impact protection is required, which is the case for many outdoor activities

abdo

Please note the information in this brochure is only accurate at the time of going to press.

Acknowledgement
ABDO would like to thank The Norville Group for providing many of the pictures that appear in this brochure.

Association of British Dispensing Opticians
199 Gloucester Terrace, London W2 6LD
Telephone 020 7298 5100
Email general@abdolondon.org.uk
Website www.abdo.org.uk

www.twitter.com/MembershipAbdo

3rd edition, June 2017