General Optical Council Approved CET For Optometrists
General Optical Council Approved CET For Dispensing Opticians

Driving and vision

Part 4 - Dispensing to drivers

In the fourth of our driving series, **Dr Colin Fowler** offers advice on areas to consider when dispensing to drivers. **Module C15898, one general CET point suitable for optometrists and DOs**

Driving is one of the more demanding visual tasks undertaken by the majority of the adult population. Questions regarding driving are routine in optometric examination, and serious consideration has to be given to this activity when dispensing the correction.

It is an essential part of any eye exam not only to assess the health and refractive status of the eye, but also to ascertain what vision is being used for. Only then can the appropriate advice be offered regarding best correction and maintenance of eye health. Driving is an activity for which vision is important and there are legal ramifications that must be addressed by the practitioner. Whether a patient drives should be discovered by the practitioner during the eye exam, or perhaps in the pre-screening or pre-exam data gathering undertaken by auxiliary staff. The requirement to drive may well then influence any prescribing decision ('I recommend a correction for driving') and also how any appliance be best dispensed.

This article aims to outline some points to consider during the dispensing process and to emphasise the importance of noting down the relevant advice given on the record card.

Frame choice

Like any spectacle frame, those used for driving should be well fitting, comfortable, provide a good field of view, and retain their adjustment over a long period of time. In order to be comfortable, as light a weight as possible is preferable, provided the style is capable of retaining its adjustment.

One of the more important features is that the design of the frame should not affect the field of view. Wide sides are to be avoided, as are lens shapes with a shallow depth. This latter feature is particularly important for multifocal lens wearers where an adequate view of the instrumentation needs to be provided through the intermediate/near portion of the lens. But also consider whether the top rim might be too low down to limit vision through the rear-view mirror without a head movement. Thick rims should generally be avoided, particularly in plus power prescriptions (Figure 1).

Figure 1 Unsuitable frame/lens combination. Spectacle frame has broad sides, thick rims. High plus lenses dispensed as small aperture lenticulars

The horizontal boxed lens size needs to be carefully considered in relation to the lens prescription. Although larger sizes would seem naturally attractive because of their inherent larger field, excessive decentration will make the lenses thick and heavy, particularly in higher prescriptions.

The optimum choice would therefore seem to be a high joint rimless mount with thin metal sides. But whatever type of frame or mount is used, it must obviously be cosmetically acceptable to the patient, or they might just decide not to wear it.

TABLE 1
Filter categories and descriptions[3]

Filter category	Description	Range of luminous transmittance	
		From over %	to %
0	Clear or very light tint	80	100
1	Light tint	43	80
2	Medium tint	18	43
3	Dark tint	8	18
4	Very dark tint – not suitable for driving and road use	3	8

Note: For photochromic filters the filter category for labelling or marking is defined by the luminous transmittance values in the faded state and in the darkened state

Lens form and material

As in any dispensing, the choice of lens form becomes more critical the higher the power. One of the modern developments that has helped the dispensing of higher power prescriptions is the wide choice of higher index plastics materials. In combination with a suitable aspheric form, this has enabled many high power prescriptions to be dispensed without resorting to lenticular forms.

High positive prescriptions are the most troublesome as the prismatic effect at the lens edge in a high plus prescription can seriously limit the field of view. This is the reason for the recent EC Directive on vision and driving[1] which the DVLA interpets as limiting Group 2 drivers to a maximum of +8.00D when wearing spectacles, although there is no limit for a contact lens correction, and no limit on minus power spectacle prescriptions. Aspheric forms will increase the field of view for plus prescriptions as a result of the reduced prismatic effect at the lens edge, and the use of a high-index material will reduce the thickness and weight.

Visual field problems are not so much of an issue for high minus prescriptions as here the peripheral prismatic effect increases the effective field of view, but again the use of higher index materials is beneficial in reducing the weight and thickness of the lenses.

Before the compulsory use of seatbelts and the widespread adoption of airbags, there were many appalling eye injuries where the driver's head had impacted the windscreen. Although this risk has reduced, eye injuries are obviously a potential hazard in any road accident, and the use of a higher impact plastic such as Trivex or polycarbonate in low to medium power prescriptions would seem a sensible precaution.

Although the legal visual acuity ▶

Figure 2 Glare – winter sunset, damp road

Figure 3 Marginal visibility of red traffic signal in bright sun conditions

requirement for driving in the UK is the number plate test, it is also essential that drivers are able to read their instruments, both for controlling their speed and assessing the state of the vehicle. It would seem therefore that some form of multifocal prescription would be necessary for presbyopes to obtain a clear view of the instruments. Progressive power lenses would appear the ideal solution, as the controls and instruments in cars are positioned at a variety of near and intermediate distances. But whichever type of lens is used, it must have a wide distance field.

Tinted lenses

Glare can be a significant problem when driving. Daytime sun glare is at its worst in conditions of low sun (Figures 2 and 3) and wet roads. Direct sunlight is best controlled by the use of the car's sun visor or by wearing a peaked hat, but glare caused by reflections requires a tint. The optimum tint would seem to be of the polarising type, as this will reduce the intensity of reflections from horizontal surfaces such as roads and car windows. Conventional photochromic lenses are often criticised for not working well in an enclosed car, due to a combination of the windscreen removing the activating radiation, and also the generally high inside ambient temperature. There is, however, a lens now available ('Drivewear') which is a photochromic polarised tint which is claimed to work well inside a car.

The author's personal preference for driving is to use a frame with a detachable magnetic mount polarising clip-on. This enables the tint to be quickly removed or re-applied one-handed, which is useful when driving through tunnels.

Anti-reflection coatings are essential for cutting down on lens reflections, particularly on high-index materials. But it is often forgotten that they should also be applied to the rear surface of tinted lenses. An uncoated tinted lens can act as a very effective concave mirror, providing annoying reflections of the wearer's face (Figure 4).

Figure 4 Rear surface of uncoated tinted lens acts as excellent concave mirror

It should be remembered that there are standards for minimum transmittance requirements both for prescription spectacles[2] and plano sunglasses.[3] These standards specify that tints for driving should have a luminous transmittance of 8 per cent or more, that there should be no excessive variation in tint density between the wavelengths 500 and 650nm, and that there should be minimum visibility of traffic signals and blue emergency vehicle warning lights. These requirements cannot be accurately checked by inspection of a transmittance curve but require mathematical manipulation of the transmittance values over the 380-780nm range of wavelengths. Additionally, the prescription lens standard states that no tint should be used for driving at night with a luminous transmittance of less than 75 per cent. Thus any tinted lens prescribed for constant wear to a driver should either have a luminous transmittance of 75 per cent or more, or should be supplied with a warning that it should not be worn for night-time driving. This should also be noted on the record card. (How this relates to filter category is shown in Table 1.)

At one time yellow tinted lenses were popular for night driving, but it has been shown[4] that these products reduce visual acuity in low light levels and lengthen reaction times, despite often giving a feeling of subjective comfort. Night-time glare is a problem for many drivers, particularly in the presence of cataract. It can be argued that bright headlamps are often inappropriate in well-lit streets, giving rise to a glare source, which makes the visibility of cyclists and pedestrians difficult for oncoming drivers.

It is also worth remembering that many cars now have tinted windscreens fitted, which will have some effect on visual performance. The transmittance curve shown in Figure 5 illustrates that the prime reason for tinted glass is not to reduce glare, but to reduce the long wavelength red and infra-red radiation to keep the inside of the car cool on sunny days. Walsh[5] has also pointed out that steeply raked windscreens can reduce light transmission to a significant degree. In addition, a raked windscreen can reflect an image of the top of the dashboard into the driver's line of

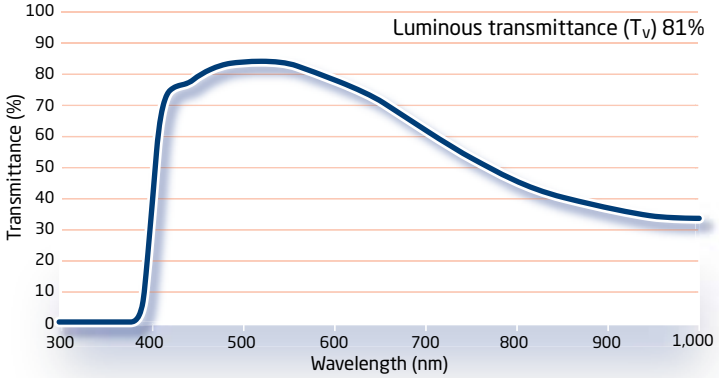


Figure 5 Transmittance of Pilkington tinted windscreen

sight, which will affect their contrast sensitivity.

Contact lenses

Many drivers, particularly pre-presbyopes, wear contact lenses. In many ways contact lenses provide the optimum vision correction, particularly in giving no restriction to the visual field. This assumes, of course, that the lenses are comfortable to wear and that the patient is well adapted. But new contact lens wearers need to be aware that the inside of the car is an artificial environment and may result in dry eye symptoms. All contact lens wearers who drive should be encouraged to keep a pair of prescription spectacles in the car in case of problems. Indeed it should be essential for all ametropic drivers who rely on a visual correction to pass the number plate test to carry a spare pair of spectacles with them.

An increasing number of presbyopes wear contact lenses for driving. A recent Australian study[6] compared the driving performance of a small number (n=11) of presbyopes on a closed road while wearing different types of contact lens and spectacle corrections. Subjects performed better when wearing single-vision or progressive addition spectacle lenses rather than wearing monovision or multifocal contact lenses. But another study[7] by the same group on a simulated driving task showed longer path lengths of eye and head movements, and more saccades, when wearing spectacle corrections compared with multifocal and monovision contact lenses. It would be interesting to repeat these studies on drivers who had worn these corrections for a prolonged period of time.

Contact lenses and driving will be covered in detail in a future article in this series.

Discussion

Whatever type of optical correction is used, it is worth reminding patients that they should only drive when they are well adapted and feel comfortable wearing their spectacles or contact lenses. Advise patients to carry a spare pair of spectacles or contact lenses, and indeed in some countries (Spain, for example) it is a legal requirement.

Whether or not patients will wear their optical correction when driving is, of course, a largely unknown factor. A survey conducted by Privilege Insurance in 2005 showed that 'almost one in five' drivers drove without wearing their spectacles. A survey by the RAC of female drivers in 2008 gave a value of one in six who did not wear their correction. Drivers should be warned of the consequences of not wearing their correction, particularly when involved in an accident and the effect on their insurance. Photocard driving licences now carry a code indicating whether a driver is required to wear an optical correction (Figure 6).

If a patient is adamant that they will not wear a correction for driving, or their visual standard with correction is such that they are outside the vision standard and they say that they intend to carry on driving, then this should be noted in the records. Where it is considered that they present a serious danger to the public, then this overrides any constraint on patient confidentiality and they should be reported to the DVLA medical branch.

● Part 5 will report on the reaction of stakeholders to the DVLA proposals on driving and vision.

MULTIPLE-CHOICE QUESTIONS – take part at opticianonline.net

1 Which of the following is the optimum frame choice for driving?
A Acetate frame with thin metal sides
B Metal frame with thin metal sides
C High joint rimless mount with thin metal sides
D Low joint rimless mount with thin metal sides

2 The Commission Directive 2009/112/EC sets the limit for power of contact lenses for Group 2 drivers at what level?
A -8.00DS
B +8.00DS
C +10.00DS
D No limit set

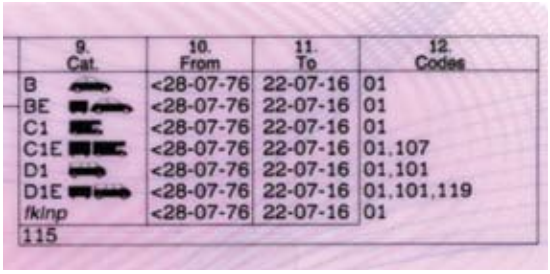
3 What is the recommended minimum transmittance for a tint for driving?
A 2 per cent
B 8 per cent
C 15 per cent
D 25 per cent

4 What are the limits for wavelength variation for a tint supplied to a driver?
A No variation allowed
B 500nm to 650nm
C 555nm to 620nm
D Visible light range

5 The prescription lens standard states that no tint should be used for driving at night with a luminous transmittance of less than what value?
A 75 per cent
B 80 per cent
C 85 per cent
D 90 per cent

6 What is the range of luminous transmittance for a category 1 filter?
A 90 to 100 per cent
B 75 to 80 per cent
C 43 to 80 per cent
D 18 to 43 per cent

Successful participation in this module counts as one credit towards the GOC CET scheme administered by Vantage and one towards the Association of Optometrists Ireland's scheme.
The deadline for responses is March 17



9. Cat.	10. From	11. To	12. Codes
B	<28-07-76	22-07-16	01
BE	<28-07-76	22-07-16	01
C1	<28-07-76	22-07-16	01
C1E	<28-07-76	22-07-16	01,107
D1	<28-07-76	22-07-16	01,101
D1E	<28-07-76	22-07-16	01,101,119
/kinp	<28-07-76	22-07-16	01
115			

Figure 6 UK photocard driving licence showing the '01' code, indicating a requirement for 'eyesight correction'

References

1 Commission Directive 2009/112/EC of 25 Aug 2009 amending Council Directive 91/439/EEC on driving licences. *Official Journal of the European Union*, Vol 52 p26, Aug 26, 2009.
2 BS EN ISO 14889:2009 Ophthalmic optics. Spectacle lenses. Fundamental requirements for uncut finished lenses. British Standards Institution.
3 BS EN 1836:2005 Personal eye-equipment. Sunglasses and sunglare filters for general use and filters for direct observation of the sun. British Standards Institution.
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5 Walsh G. Automobile windscreen rake, spectacle lenses, and effective transmittance. *Optometry & Vision Science*, December 2009; Volume 86, Issue 12, pp1376-1379.
6 Chu BS, Wood JM and Collins MJ. The effect of presbyopic vision correction on nighttime driving performance. *Invest Ophthamol Vis Sci*, 2010;51:4861-4866.
7 Chu BS, Wood JM and Collins MJ. Influence of presbyopic corrections on driving-related eye and head movements. *Optom Vis Sci*, 2009;86:11 E1267-E1275.

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