

TRIFOCALS

A review of the available IP/RP ratios for the more common types of trifocal, and the significance of this property is worth revisiting.

The IP/RP ratio is the ratio of the intermediate addition to the reading addition of a trifocal. Given the reading addition and the IP/RP ratio, the power of the intermediate addition is simple to determine:

$$\text{Inter add} = \text{IP/RP ratio} \times \text{reading add}$$

Thus if the reading addition of a trifocal with a 50% IP/RP ratio is +2.50D, the intermediate addition will be +1.25D. Most standard trifocals are made with a 50% IP/RP ratio, but there are some which can be made with higher or lower IP/RP ratios. Occupational trifocals can be made with some IP/RP flexibility. A higher IP/RP ratio will give a closer intermediate working distance than a lower one, the reading addition, of course, being unaffected. Standard trifocals can be obtained with straight top segments, 22mm, 28mm and 35mm, with an intermediate segment depth of 7mm or 8mm, and also in executive form. There are no concentric segment designs. Most of these are also available in photochromic materials.

OCCUPATIONAL AND SPECIAL ORDER TRIFOCALS

Conventional power zone position trifocals

Occupational trifocals with the intermediate and near vision segments in the lower part of the lens may be used if there is no requirement for intermediate or near vision above the horizontal. There are three basic designs of this nature.

Large/deep segment trifocals

Rodenstock's CR39 C40 Datalit Trifocal has been specially developed for VDU users. The curved top front surface segment is 40mm x 35mm, including an intermediate portion 10mm deep. IP/RP ratio is 66 per cent. The segment is quite visible, but provides a generous screen (intermediate) viewing area. A 12" screen can be viewed in its entirety at 50cm. With modern small eyesizes, the segment may be almost as wide as the horizontal lens size. The intermediate segment depth is insufficient for use with large screens, so it is not ideal for workers engaged in design work, publishing or magazine layouts. However, if there is side-to-side head movement, for example in copying to the screen, or carrying out an activity to the side of the screen, or if a laptop computer is used, then this lens may be the choice. The lens may also be used in non-office environments, such as dentistry, chiropody, hairdressing and horticulture.

If a deeper intermediate portion is

OCCUPATIONAL DISPENSING

PART 4: OCCUPATIONAL LENS TYPES - OCCUPATIONAL TRIFOCALS AND PROGRESSIVE POWER LENSES

Paula Stevens discusses the more unusual lens types and their dispensing.

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necessary for large screen work, then 14mm is the maximum available in this type of design. The Norville CR39 S1435 will give a vertical field of view, with most intermediate lens powers, suitable for screens up to 18", viewed at 50cm. (NB: Computer screen sizes are specified by their *diagonal* dimension.) The IP/RP ratio is the same as the Datalit, at 66%.

Executive Trifocals

Conventional E-line trifocals have an intermediate segment depth of 7mm. This is of limited use for intermediate tasks, giving a vertical field of view in the order of 14cm at 50cm working distance. Norville manufacture a CR39 E-line trifocal with a 14mm intermediate depth. Whilst this lens offers the maximum horizontal field of view, as wide as the horizontal finished lens size, its thickness will be governed by the near vision prescription. This means that if the lens is, for example, +2.00DS with a +3.00 reading addition, the lens thickness will be that of a +5.00DS single vision lens. Prism thinning is automatic by some companies to minimise thickness, and certainly a minus powered distance prescription will produce a thinner executive style lens. It may be wiser, therefore to consider the S1435, rather

than the E-line, if intermediate vision is not a necessity at the extreme temporal region of the lens. Also, Norville advises that MAR coating and hardcoating cannot be supplied in executive designs.

ED Trifocals

An ED design is a combination of an executive design, with the dividing line between the distance portion and the intermediate zone extending to full width, incorporating a D-segment in the lower part of the lens. Sola's CR39 ED trifocal places the 25mm D-segment 8mm below the dist/inter dividing line, giving intermediate vision to the temporal side of the segment. This design is not available in glass. The Signet Armorlite Triseg ED trifocal offers a deeper intermediate zone at 11mm, combined with a 28mm D-segment. Both are 50% IP/RP ratio, but 60% is available from Norville in the 11/28 design. Coating restrictions are the same as for executives.

Non-conventional power zone position trifocals

All the above trifocals carry the power zones from distance at the top of the lens, to near vision at the bottom. Occupational tasks may, however, require

that these zones are not in this arrangement. One way of varying the arrangement is to use the lenses upside down, and the E-line designs lend themselves to this. It is rare for only the distance portion to be needed in the lower part of the lens, and in order to accommodate useful intermediate and

near vision areas, the upper rim of the frame may have to be raised above the brows. Occupations which may fall into this category are electricians, aircraft technicians and car mechanics.

Designs which allow some flexibility in zone arrangement are the Double D, Double E, and the Upcurve Downcurve.

An Upcurve/Downcurve with 25mm fused round segments is still available from Norville, although only on special order from the USA, but other sizes of round segment are difficult to source, the only alternative being a bonded combination of segments. Then, of course, virtually anything is possible. Flexibility in the choice of zone position has diminished gradually with the years, but the diagrams in **Figure 1** show the currently available combinations.

Double D near vision additions start at +1.75, which precludes the use of the central section for intermediate use, except for adds over 3.00D. Norville can advise on non-standard combinations of segment sizes, or special order segment separations. They can also supply a limited range of quadrifocals, which are D-segment trifocals incorporating an inverted D-segment in the upper portion of the lens.

OCCUPATIONAL PROGRESSIVE ADDITION LENSES

Occupational progressive power addition lenses (OPALs) are marketed either as lenses with limited distance vision zones, or as near vision lenses which extend the near vision range to intermediate distances above the near zone. Rather than specifying fitting cross position with reference to the horizontal and vertical pupil centre for distance, some have standard measurements, and some require a different reference point. As with all progressive power lenses, their main advantage is the absence of a sharp division between power zones, and the provision of powers between full addition, intermediate and distance. Their disadvantage is that, through the peripheral areas of the lenses, straight edges and lines appear curved, making them unsuitable for occupations such as carpentry or tailoring. Also, although the intermediate and near portions are wider than conventional progressives, the field of view in these areas cannot match medium or large segment bifocals or trifocals. Architects, design engineers and artists requiring a large field of view are better provided for with a multifocal.

Extended near vision progressives

Zeiss Business: This is a Clarlet lens with near vision emphasis. It is available in two versions, Business 10 and Business 15. The upper portion of the Business 10 is reduced in power by 1.00 from the near Rx, the Business 15 by 1.50. It is recommended as a near vision lens with useful clear vision beyond the habitual reading distance, out to armslength. It is a lens which is suited to deskwork, including VDU, and is an excellent choice for table games including chess and cards. Although classified by Zeiss as a single vision lens type, and can be ordered by specifying power required

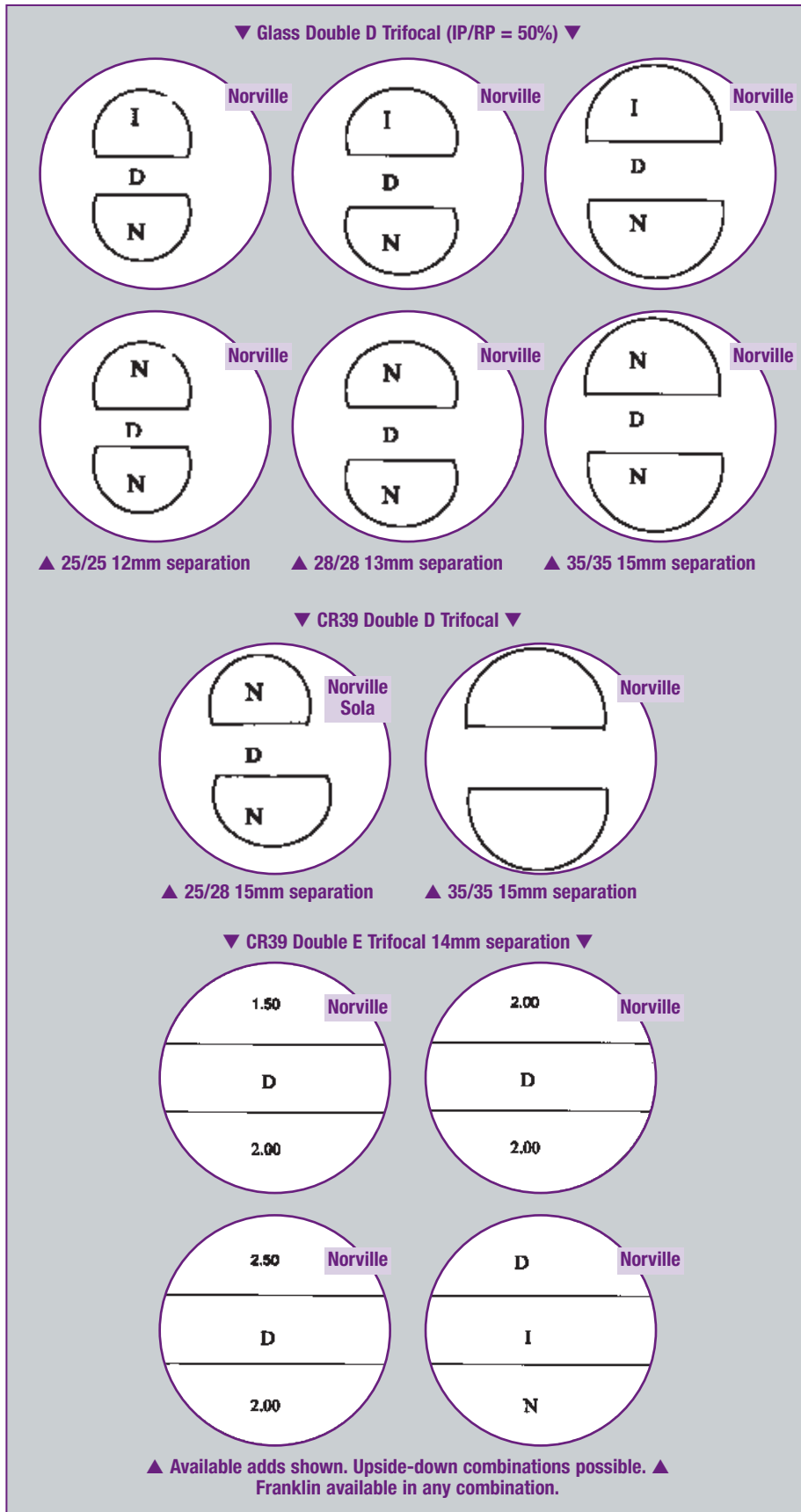


Figure 1: Double D and Double E power and segment combinations.

and horizontal centration only, it is recommended that the required vertical fitting cross position be specified.

Rodenstock Cosmolit Office: This is a very similar lens to the Zeiss Business, offering two choices of power modulation. The Office 10 is equivalent to the Business 10, whereas the Office 17 gives a power reduction of 1.75. Lens measurement should be as for ordering a conventional progressive, and ensure that the frame has a depth of at least 22mm beneath the fitting cross.

Essilor Interview: This lens provides the full reading addition at 9mm below the pupil centre, reducing by 0.80D at the pupil centre. This limits the maximum distance for clear vision: for example, an addition of +2.50 would give a maximum intermediate distance of 58.8cm. Although this appears adequate, most people are more comfortable if the main task is not situated at the absolute limit of the intermediate range. The lens is ordered by specifying the near vision Rx, the near centres and the lower limbus position, measured from the horizontal centre line of the frame.

Sola Access: The Access completes the available range of enhanced reading lenses from the larger companies, offering an intermediate power 1.25D less than the full reading Rx, the difference in powers being set 12mm apart. When the frame is on, the pupil centres should lie 3-5mm above the horizontal centre line. The lens is then ordered by specification of the near vision Rx, and the near centration distance. The lens is normally glazed with the fitting line set on the horizontal centre line of the frame.

Taylor Office: This is the only extended range reading lens which offers a choice of three intermediate power reductions. It should be ordered by near vision Rx, pupil centre position in primary gaze, and required intermediate power reduction: the choice is 0.75, 1.25 or 1.75.

AO Technica: The CR39 Technica was the first progressive lens developed specifically to optimise near and intermediate viewing. Its bipolar design results in a soft design lens with limited distance field of view. It is ordered the same way as a conventional progressive, with regard to the fact that 80 per cent of the near vision addition is reached 7.5mm below the fitting cross.

Zeiss Gradal RD: The Gradal RD design is more than an enhanced reading lens, being more similar to conventional progressive power lenses. It is available in Clarlet (CR39) and 1.6 index glass. It is designed for indoor use, the upper

portion being for mid-distance use. Ordering is by specifying the distance primary position pupil centres, distance correction, to which Zeiss adds +0.50 to provide mid distance vision, and the near addition. The near vision addition is then reduced by 0.50 in order to arrive at the near vision power. Because the add from top to bottom of the lens is effectively reduced by 0.50, a wider intermediate and near zone results.

The lens has a progression length of 25mm, longer than most conventional progressives. The consequence of this is that the full addition is reached further down the lens, so a frame should be chosen which is deep enough to accommodate the lower near vision zone. As a comparison, the full reading addition of a bifocal is reached at around 8-10mm below the pupil centre, and so the Gradal RD is suitable for occupations where intermediate vision is of prime importance, with only an occasional near requirement. Caution should be observed if dispensed as an occupational lens to a full-time bifocal wearer.

AO Omni: The Omni is included here as an occupational progressive, although it can be regarded as an ultrasoft design, which can be supplied for non-occupational use. Its main limitation for general use is the narrow distance portion. This allows the spread of the aberrational astigmatism over more of the lens surface, resulting in wider intermediate and near zones. Lens ordering is the same as conventional progressives.

A comparison of isocylinder plots is shown in **Figure 2**.

General fitting principles for occupational progressives and extended range reading lenses

Apart from the Essilor Interview lens, all the above OPALs require the pupil centre position to be indicated when ordering. However, for enhanced reading lenses, when the eyes are in the primary position, the wearer will be viewing intermediate distances, or at least some way down the power modulation zone. It is wise, therefore, to mark the pupil centres with the wearer viewing an intermediate to near target, and to order the horizontal centration accordingly. Access lenses have no separate right and left designs, and so they are not manufactured with any inset from inter to near. Specifying distance centration for these lenses will introduce a prismatic effect on convergence, which could cause some visual discomfort and problems with adaptation to the lenses. Also, to optimise comfortable use of the full reading Rx with the head as it is normally lowered for deskwork and other near tasks, the fitting cross position are best set 2mm or so higher than primary position pupil centres.

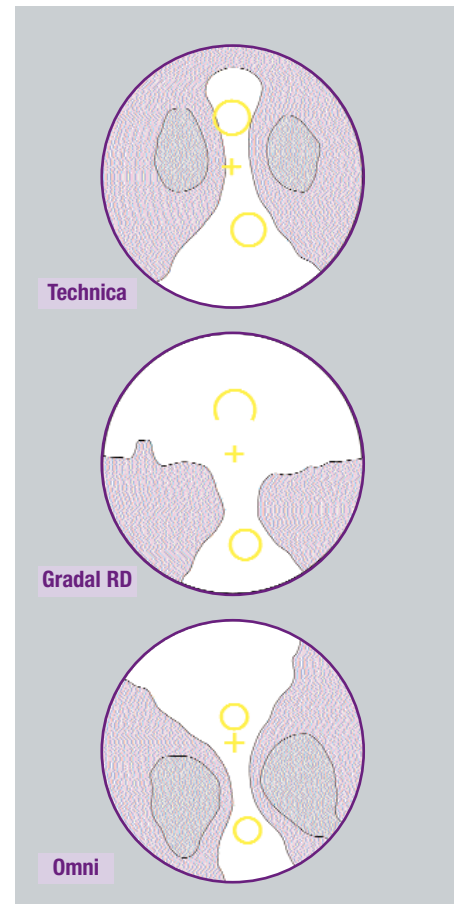


Figure 2: Isocylinder plots for occupational progressives. Each plot is for Add +2.00. From the central portion of the lens to the periphery, each isocylinder line represents an 0.50 increase in cylinder power.

This series of articles has illustrated that providing spectacles for the occupational needs of patients lies firmly within the remit of the dispensing optician. Many lenses have been developed expressly to fulfil occupational requirements, while many 'evergreen' multifocal designs continue to be supplied. For how long, it is hard to say, as much modern dispensing is done with speed as first priority. Dispensing for specialised activities takes time and skill. As lens designs are ordered less and less frequently, they are taken out of production, and it would be a tragedy to lose the extensive choice of lenses which are available now.

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