

# THE FACTS ON MAGNIFICATION?

## Terms used in connection with magnification:

The definitions of commonly employed terminology below are intended to help you understand what magnification means.

### Magnification factor

(also referred to as the **magnification effect**): The degree by which the observed object is enlarged. The magnification factor is stated as a numerical value followed by an x (e.g. 4x).

### Diopter:

This term describes the refractive power of a lens. The diopter also establishes a relationship between magnification factor and focal length (see table below for relationship between diopter and magnification factor).

### Focal length:

This is the distance between the centre of the magnifier and the observed object at which **no distortion** occurs.

### Basic rule:

The focal length and the size of the lens decrease as the magnification factor increases.

### Useful tip:

In order to obtain the maximum distortion-free magnification factor, you should keep the magnifier at a distance of around 25 cm from your eyes.

### “System magnification”:

The most commonly employed measure of magnification is the so-called system magnification. In addition to the magnification effect of the lens, this formula also takes the observer’s visual acuity into consideration. A mean reference visual range is included in the formula to take account of the individual using the lens/magnifier.

As we state the magnification effect in diopters (dpt), it is useful to understand the relationship between diopters and magnification factor (x). The following simple formula can be used for calculation purposes.

$$\text{Magnification factor (x)} = \frac{\text{Diopters of lens}}{4} + 1$$

or, more simply,

$$x = \frac{D}{4} + 1$$

When calculating the system magnification of the 3 diopter lens in the FGL 118 luminaire, this formula applies as follows:

$$x = \frac{3 \text{ diopters}}{4} + 1 = 1.75x$$

## Examples of magnification factors



1x no magnification



3x or 300% of the original size, observed through an 8 diopter lens



1.75x or 175% of the original size, observed through a 3 diopter lens



4x or 400% of the original size, observed through a 12 diopter lens



2x or 200% of the original size, observed through a 4 diopter lens



2.75x or 275% of the original size, observed through a 7 diopter lens



5x or 500% of the original size, observed through a 16 diopter lens

Magnification factor (x)	Diopters (dpt.)	Focal length (Inch)	Focal length (mm)
1.63	2.5	16	400
1.75	3	13.3	340
2	4	10	250
2.75	7	5.7	145
3	8	5	127
4	12	3.3	84
5	16	2.5	63