

West Haddon Photo Club

Lens Filters

Camera lens filters can serve a variety of purposes in photography. They can be indispensable for capturing or enhancing scenery in difficult lighting conditions, they can enhance colours, they can reduce reflections or they can simply protect lenses.

There are circular, square and rectangular filters. Circular filters screw on to the lens filter thread on the front of the lens. Rectangular/square filters have to be used in a filter holder which, in its turn, slides onto a threaded ring that is screwed on to the lens filter thread.

Filters are widely used in photography and while some photographers only use filters in rare situations, others may rely on filters for their everyday work. For example, landscape photographers may use various filters on a regular basis, while street and portrait photographers rarely need to bother, or need, to use them.

Since digital photography is all about the quality and intensity of light, lens filters are often necessary to modify the light as it enters the lens and before it reaches the sensor or film. Some of the built-in tools in Lightroom and Photoshop can simulate filter behaviour, possibly making some filters redundant in the digital age.

But the effects of some filters can't be simulated in software and some actually help in getting even better results during post-processing.



1. What are Filters and Why use Them?

Why do you wear sunglasses? Because along with other benefits, they help you see better in intense light, protect your eyes from harmful UV rays/wind/dust and reduce glare. Filters also serve a similar

purpose on camera lenses – they can help reduce reflections, protect your lenses from potential damage, fully or partially reduce the amount of light that enters the lens and even enhance colours.

At the same time, filters can adversely affect photographs if they are not properly used. So not only do you need to know what filters to use, you also need to know how to use them and when to use them.

Filters are transparent discs, squares or rectangles that attach to the front of a lens (there are also drop in filters for some very expensive and exotic telephoto lenses but we are not concerned with those here). Their purpose is to modify the light entering the lens in some way for creative or enhancing purposes or sometimes they are just there to protect the front element of your very expensive purchase!

The range and quality of filters is huge, from cheaper plastic or acrylic to very expensive glass filters. There are loads of different kinds of filters available and this can make the process of choosing the right filter type challenging. But as in most cases you get what you pay for.

Let's look at some of the different types of filters that are available today. Only the more mainstream filters are referred to here. Others are available but have limited applications and are not needed for the majority of photographic situations.

2. Overview of Types of Lens Filters

Here is a list of typical lens filters you can purchase today, along with descriptions of their purposes:

Filter	Photography Type	Uses
UV/Clear/Haze Filter	Any	Protects the front element of a lens from dust, dirt, moisture and potential scratches. High quality clear filters can be permanently mounted on lenses with a minimum impact on image quality.
Polarizing Filter	Any	Filters out polarized light, dramatically reducing reflections, enhancing colours and increasing contrast. Can be used for any type of photography. Polarizing filters are typically circular, allowing for easy control of the effect of polarization.
Neutral Density (ND) Filter	Landscape Photography	Reduces the amount of light entering the lens, thus decreasing camera shutter speed. Useful for situations where motion blur needs to be created (rivers, waterfalls, removing people).

Filter	Photography Type	Uses
Hard-Edge Graduated Neutral Density	Landscape Photography	Hard-edge ND Grad filters are primarily used in high contrast situations, where the sky is much brighter than the foreground and the horizon is flat. These filters are always rectangular (giving the ability to move them in all directions) and are typically used with filter holders.
Soft-Edge Graduated Neutral Density Filter	Landscape Photography	Soft-edge ND Grad filters are also used in high contrast situations, but where the horizon is not necessarily flat. The soft edge allows for smoother transitions, making the use of a filter less evident. Soft-edge ND Grad filters are also rectangular and are normally used with filter holders.
Reverse Graduated Neutral Density Filter	Landscape Photography	The reverse ND Grad is a specialized filter used by landscape photographers when shooting against the sun while it is setting close to the horizon. While a regular ND Grad filter gradually transitions from dark to clear towards the centre, a reverse ND Grad filter transitions from dark to less dark from the centre to the top and bottom edges.

3. Types of Lens Filter

Circular screw-on filters – the most popular lens filters are circular, screw-on filters. These mount directly onto the filter thread in front of a lens and come in different sizes, depending on the lens filter thread. The most common size of screw-on filters for professional lenses is 77mm. The filter thread size of any lens can be found printed on the barrel of the lens. Circular screw-on filters include Clear/Haze/UV filters, circular polarizers and neutral density (not Grads). Circular filters also come in different thickness mounts – some are so thick that they can potentially cause vignetting, while others are ultra-thin to reduce vignetting. Some circular systems now attach using magnets.

Square filters – a popular choice for landscape and other photography. A filter holder attaches to the lens by way of a threaded ring that fits the lens filter thread. Rings come in different sizes so can be used on most lenses. Holders can take one or more filters which can be stacked together in certain situations but stacking can negatively impact image quality and add unwanted reflections.

Rectangular filters – another popular choice, primarily among landscape photographers, these are mounted just like square filters via a filter holder system. Because it is impractical for graduated neutral density filters to be circular (due to different sizes of high-contrast areas and composition), rectangular filters are the primary choice for landscape photography. Unlike square filters, they have

more room to move up and down within the holder to position any graduation over the area of interest to the photographer.

4. Lens Filters in Detail

It can be difficult to understand what each filter does and decide on whether you need it or not, so the following information may make it easier to decide whether you want a particular type of filter or not.

Clear/Haze/UV Filter



The purpose of UV/Haze filters was to block UV light from hitting the film and adversely affecting image quality in film cameras. Digital camera sensors have a UV/IR filter in front of the sensor, so there is no more need to use UV filters on DSLRs but some photographers use these types of filters for lens protection because it is easier and cheaper to replace a filter than to try to repair a scratched or broken lens element.

But a better solution for lens protection is to use clear filters. One thing to be sure of before buying a clear filter is to buy high quality glass with special multi-resistant coating (MRC). The worst thing you can do is mount a low quality filter in front of an expensive lens. Not only might it affect image quality, it may also add unwanted reflections, ghosts and flares to your images.

Should you use a clear filter permanently on your lenses? This question can cause heated debates amongst photographers. Many believe that adding a piece of glass in front of lenses only harms images and does very little to protect them, while others like to keep them in place all the time for peace of mind and easier cleaning.

It is a personal choice but on balance it may be better to protect the front lens element and it is certainly easier and safer to be able to clean a relatively inexpensive filter, that can be replaced if damaged, than to risk your front element.

Because of the risk of vignetting when stacking circular, screw-on filters it is best avoided if possible.

Polarizing Filter



There are two types of polarizing filters – linear and circular. **Linear polarizers should not be used on DSLR cameras, because they can result in metering errors.** Circular polarizers, on the other hand, are perfect for DSLRs and do not cause metering issues due to their construction. Circular polarizing filters are essentially linear polarizers, with a second glass element attached to their back that circularly polarizes the light, giving accurate exposure results when the light hits the light meter. When the two elements are aligned at the right angle and orientation from the sun, the captured image will have more saturated colours, bluer skies, less reflections and higher overall contrast. Polarizing filters can also reduce haze, which is very useful for landscape photographers.

As well as enhancing blue skies, circular polarizers can also reduce reflections in water and can saturate colours and reduce reflections on vegetation, especially useful for water drops on leaves.

There are a couple of potential issues that need understanding when using a polarizing filter:

There is a minimum and a maximum effect of polarization, depending on the filter alignment. You should rotate the filter every time you compose for best results. Take a look at this example of minimum and maximum effect of polarization:



The effect of polarization changes relative to the sun. The maximum effect of polarization is achieved when the lens is pointed 90 degrees from the sun (in any direction). Avoid using a polarizing filter on ultra wide-angle lenses. You might end up with a partially dark sky that will be

tough to fix in post-processing. Here is an example of what happens when using a polarizer on a wide-angle lens:



In some cases the maximum effect of polarization can result in an unnatural-looking dark blue sky as shown below:



There is a loss of approximately 2 stops of light when using polarizing filters, so you should watch your shutter speed when shooting with a polarizer hand-held. Polarizing filters are typically thicker than regular filters and therefore can result in unwanted vignetting.

To avoid vignetting, polarizing filters should not be stacked with other filters. Due to light loss, you should also use a polarizing filter only when needed. But vignetting can usually be removed in post.

Neutral Density (ND) Filter



A neutral density filter is darkened over its entire surface to reduce the amount of light getting to the sensor, thus decreasing the shutter speed and increasing exposure time. They can be obtained in different strengths to achieve different creative ends, usually to create effects such as blurring or smoothing moving water or clouds. Or they can be used to “remove” people from a scene as, over the time of a lengthy exposure, moving people will not show up on the final image.

For example, if you are photographing a waterfall and your starting point is ISO 100, f/2.8, 1/2000 that results in good exposure. Stopping down the lens to f/22 will only slow down the shutter speed to 1/30 of a second. This would still be too fast if you wish to create a “foggy” look for the falling water. By using an 8 stop neutral density filter, you could slow down the shutter speed all the way to 2 seconds while keeping lens aperture at f/11 instead of f/22 (using apertures beyond f/11-f/16 in normal lenses decreases image quality due to diffraction).



Neutral density filters can be either circular or rectangular but it may be best to buy rectangular, especially if you intend using ND filters on different lenses with different filter thread sizes. If you buy circular it will only fit one thread size whereas rectangular can be used on multiple lenses.

Graduated Neutral Density (ND Grad) Filter

Filter Holder for Square or Rectangular Filters



The difference between full neutral density and graduated neutral density filters is that the latter is half clear. Because the size of sky versus the foreground can change depending on the composition, most ND Grad filters are made in a rectangular shape and these filters must be either used with a filter holder system, or must be held by hand in front of a lens.

Like full ND filters, ND Grads come in a range of densities that cut out more or less light depending on the degree of shading applied to the filter. So a choice needs to be made about which one to use depending on the dynamic range in the image.

There are two main types of ND Grad.

- a. Hard-Edge Graduated Neutral Density (ND Grad) Filter



Hard-edge graduated neutral density filters can be very useful in high-contrast situations, where the sky is very bright compared to the foreground and the horizon is flat, e.g. seascapes, where the horizon is uninterrupted (due to hard transition from dark to clear). While photographing, the hard edge in the centre is aligned with the horizon. The sky is then darkened depending on the intensity of the filter whilst the foreground exposure is unaffected. A two or three stop hard-edge ND Grad filter is often sufficient to balance the shot.

Note that if the horizon is pretty much straight the filter edge and transition will not be visible in the image.

The problem with hard-edge ND Grad filters is that the horizon is rarely flat and is often interrupted by hills, trees, buildings etc so soft-edge ND Grad filters are often more useful. Be careful if stacking hard-edge ND Grad filters in high contrast situations – both hard and soft ND Grad filters should be properly aligned to avoid nasty transitions.

b. Soft-Edge Graduated Neutral Density (ND Grad) Filter



Compared to hard-edge ND Grad filters, soft-edge graduated neutral density filters gradually transition from dark to clear, allowing photographers to use these filters when photographing a non-flat horizon. While mountains, hills and other objects above the horizon can be problematic for hard-edge ND Grad filters, soft-edge ND Grad filters work much better in those situations instead, due to the gradual transition.

As with hard ND Grads they can be obtained in different strengths.

5. Filter Material – Glass vs Resin Filters

Filters can be made from glass, plastic, resin, polyester and polycarbonate material. Glass filters are typically of the highest quality, but are expensive and tend to easily break, especially the square or rectangular type. Plastic and resin filters are much cheaper than glass and do not easily break – they are the top choice for graduated neutral density filters. Polyester filters are much thinner than glass or resin and are of very high quality, but are prone to scratches and hence not very practical on the field. Polycarbonate filters are very tough, scratch-resistant and are a good alternative to plastic/resin filters.

Some enterprising photographers save themselves some money by using welding glass as an ND filter. It works but you need to work out the exposure times by trial and error and you will almost certainly finish up with a colour cast on the image. But that can usually be removed in post.

6. Step-Up / Step-Down Rings

Because filters can be expensive, it is much cheaper to buy a single standard filter (for example 77mm) and buy step-up rings for lenses that have smaller filter threads. Step-down rings can cause vignetting and other problems, so always try to use step-up rings instead. You can buy step-up rings for both circular and square filter holder systems in various sizes.