

## Long exposures - why?

“Forced” - i.e. you have no choice. Insufficient light even at widest aperture + highest ISO for an image to be recorded, e.g. night time scenes

“Creative” - blur some or all of the subject for creative effect - what the eye does not see. Waterfalls, star trails, clouds moving etc. Length varies depending on subject - a second or so for waves on a beach or a moving car, 10-20 seconds for traffic trails, up to a few minutes for star trails or to turn the sea to milky mist.

## What’s needed?

Tripod\*

Remote release / timer / bulb control

Filters

\* unless moving the camera is how you’ll achieve your image!

## How to increase exposure time?

If you want a specific length of exposure, use Shutter Priority, set ISO or Aperture (or both) to adjust automatically as necessary.

If you just want the longest exposure possible, set ISO to lowest “proper” value, and aperture to narrowest (highest number) setting. Shutter speed will give longest exposure time that suits.

Downsides of the above methods:

- Very small apertures (F16 - F22 etc.) can lose sharpness due to diffraction
- During the day, exposures may still not be as long as you require

This can be overcome with the aid of ND filters. Available in various shades of darkness, these will increase the length of exposure required if all other settings are kept the same, or alternatively means you can use a wider aperture to get the same shutter speed.

Confusingly, filters are sold in different types of measurement. A couple of examples are:

ND .Number	ND number	Fraction opening	Stops difference
ND 0.9	ND8	1/8	3
ND 3.0	ND1000	1/1024	10

In the above examples, the first two columns are both ways filters are often sold. The “Fraction opening” is the effective size of the aperture in the lens with the filter applied (i.e. with the ND8, the camera is seeing 1/8th of the light it would see without the filter. The number of stops is the difference that adding the filter makes on the same scale as other camera setting changes. For instance, changing your lens aperture from F/2.8 > F/4 > F/5.6 > F/8 is 3 stops difference, therefore the shutter speed with the filter on the lens (and the lens set at F/2.8) would be the same as if the lens was set to F/8 without the filter.

There are various apps you can download to help calculate these, but for the most part you can let the metering in the camera work it out for you, unless your exposure time goes over 30 seconds.

If you already have a polarizing filter, it’s worth noting that this has a darkening effect too. In general this is similar to a 2-stop filter (ND0.6 / ND4), which can be enough to increase exposure time from, say 1/60s to 1/15s - not a huge amount, but possibly useful.

The hurdle can come with very dark filters such as the ND1000. Exposures with this kind of filter can be up to a few minutes depending on the light levels. Cameras generally don’t meter over 30 seconds so you’ll need to use Bulb (B) mode and work out the exposure length. The good news is it’s less critical - there’s little difference between 1m30s and 1m45s. Very dark filters can also lead to colour-casts in the final image so it’s recommended you shoot in RAW to make it easier to correct the white balance afterwards (converting to mono is another popular choice) To work out the exposure, there are again apps, although some filters such as the Lee “Big Stopper” come with a handy card to help you out. Some example 10-stop filter settings:

Original	With filter	Original	With filter
1/500 s	2 s	1/15 s	1 m
1/125 s	8 s	½ s	8 m
1/60 s	15 s	2 s	32 m

As you can see, a 10 stop filter enables very long exposures if your starting-point is already fairly slow, such as 1/60 s.

### Long exposure by stacking shorter ones

Commonly used for astrophotography, but can be used with other subjects too (google “timestacking”)

Advantages- You get a better signal to noise ratio which leads to a cleaner image. You can also avoid brighter elements in the scene getting over-exposed when doing, for example, star trails.

Disadvantages - This technique requires work afterwards to produce the final image. If one shot in the middle fails, it can ruin the sequence (or require a lot of work to sort out) if you're doing something like star-trails where you're capturing motion. Various tools available such as "Starstax", "Deep Sky Stacker" or simply Photoshop. For star trails, begin with "lighten" blending mode. For deep-space stuff you want to average frames instead. This works to reduce noise because the noise is random and the subject (stars etc.) are not. As you average out multiple images you're reducing the proportion of noise in relation to the subject matter.

**Software links:**

Starstax (for startrails): <http://www.markus-enzweiler.de/software/software.html>

Deep Sky Stacker (for improving noisy night sky images):

<http://deepskystacker.free.fr/english/index.html>