

## ND FILTERS: FIXED OR VARIABLE DENSITY?

We have tested the new MARUMI filters ND fixed to lengthen the shutter speed, also by mounting in series. Differences with ND variable filters.

The photographic language offers greater possibilities to the creative photographer, allowing him to choose between color and black & white, to the absolute sharpness and extreme image softness. But not only. The photographer can choose between very fast shutter speed even 1/50.000 sec. (with flash), or very long shutter speed to give the effect of blur of the subject, until it literally disappears from the image.

It is precisely the technique to lengthen the exposure time that we speak about in this article, that is ND filters, inspired by the new filters of the Japanese Marumi, one of the leading manufacturer.

### How is a ND filter made

The function of neutral density filters is to absorb a certain amount of light to the same extent for all colors of the spectrum so as not to change the intonation of the image.

These filters are available in both type to fixed absorption the variable density of which we have written in the Tutti Fotografi May 2014 edition. The fixed absorption filters of course continue to be produced, and if of the one hand require to buy one for each absorption factor, on the other hand provide a greater quality; in fact the variable filters to maximum absorption, can introduce colors as they are cross-polarizers.

Returning to fixed absorption filter can be realized both optical crystal that methacrylate; the Marumi ND filters are only crystal, more resistant to scratches and with a better light transmission.

In general the ND filters come to an absorption factor even 1000x, equal to 10 stop; in practice this means that instead of shooting at f/11 1/250 sec., you can expose with a 4 sec. shutter speed, always at f/11.

To the growing of the filter coefficient absorption increases as follows; a ND4 filter absorbs 2 stop, a ND8 filter absorbs 3 stop, a ND16 filter absorbs 4 stop and so on.

By mounting the lens more than one ND filter the total absorption doesn't correspond to the simple arithmetic sum. The choice of the ND filters set to be used must come from a precise assessment of the exposimetric need. And if you shoot with film, today you can count on, 25 ISO film, a well below sensitivity that which is the standard for digital cameras.

### How to use ND filters

To use the best of these filters you should first set the sensitivity of the ISO camera on the lowest available and close the aperture to the minimum possible value, compatibly with depth of field required by the shooting and the optical lens aberrations.

At this point you estimate the effect to be obtained according to the subject movement; for example water, by lengthening the the shutter speed, it loses contrast and gives a better impression of its flow. Already using 1/30 or 1/15 sec. the water of a waterfall takes on a "velvety" appearance. In the case of a cliff on the sea the effect is also obtained with relatively fast shutter speeds, it depends on how much the sea is rough. And in a crowded square, people become ghost, less and less visible as you lengthen the shutter speed or increase the people's speed. The color of the clothes are also very important: people dressed in dark "disappear" first. The ND filters can also be used in the video shoot; if the frame rate is constant, the use of the filters allows to vary the lens aperture and thus to vary the depth of field.

### **Practical tips to make the best use of ND filters.**

- 1) Buy the filter according to the lens of your lens equipment that as the largest diameter, so as to adapt the filter to the other lens with the lower diameter with the adapter rings. ( Marumi has all adapter rings ). The saving is remarkable
- 2) Also with ND filters is better to use the lens hood to avoid unwanted reflections.
- 3) The time of shooting is to be chosen according to the maximum filter absorption; it's obvious that if you shoot in a cloudy day it's will possible to use longer shooting times.
- 4) The camera has to be absolutely mounted on the tripod and you must use a wireless remote control. If you don't have a remote control you should use the self timer, and perhaps the intentional reflex mirror up.
- 5) Always disable the VR system both the camera, then the lens.
- 6) Autofocus must be disable as the filter absorbs many f/stop, whereby the autofocus can be not accurate and in some cases impossible.
- 7) Set the minimum ISO sensitivity available up.
- 8) Avoid the AUTO white balance, is better the pre-set White Balance
- 9) Shot in RAW format because it is possible that the file should request post-production intervention.
- 10) Pay attention the cleaning of all the filter surfaces.
- 11) When you gradually close the aperture pay attention to the diffraction that causes a loss of quality of the image ( and increase the visibility of the dust on the sensor )
- 12) With long shooting times it's better to cover the eyepiece; in fact if the eye is not on the eyepiece, light leaks could be possible with the result of wrong exposition. If the camera doesn't allow to cover the eyepiece, you can use a black tape, or something else, like a black glove.
- 13) Some cameras incorporate a ND filter, in general 2x or 4x; the incorporate ND filter can be used together with a ND filter screwed on the lens.

### **The judgment**

We have tried these density fixed filters for a long time ( ND8, ND16, ND32 and ND64 models ) just as had tasted ND 400 Variable; we have verified the high light transmission and the possibility of mounting them in series to increase the absorption. Also remarkable is the metal frame of the surface which improves the grip for assembly and disassembly.

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<b>Unfiltered Starting</b>	<b>0.3 O.D</b>	<b>0.6 O.D</b>	<b>0.9 O.D</b>	<b>1.2 O.D</b>	<b>1.5 O.D</b>	<b>1.8 O.D</b>	<b>2.1 O.D</b>	<b>2.4 O.D</b>	<b>2.7 O.D</b>	<b>3.0 O.D</b>
<b>Shutter Speed</b>	<b>ND2x</b>	<b>ND4x</b>	<b>ND8x</b>	<b>ND16x</b>	<b>ND32x</b>	<b>ND64x</b>	<b>ND128x</b>	<b>ND256x</b>	<b>ND512x</b>	<b>ND1000x</b>
<b>(correctly exposed)</b>	<b>f-stop 1</b>	<b>f-stop 2</b>	<b>f-stop 3</b>	<b>f-stop 4</b>	<b>f-stop 5</b>	<b>f-stop 6</b>	<b>f-stop 7</b>	<b>f-stop 8</b>	<b>f-stop 9</b>	<b>f-stop 10</b>
1/8000s	1/4000s	1/2000s	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s
1/4000s	1/2000s	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s
1/2000s	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s
1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s
1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s
1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s
1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s
1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s
1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s
1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1 min
1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1 min	2 mins
1/4s	1/2s	1s	2s	4s	8s	15s	30s	1 min	2 mins	4 mins
1/2s	1s	2s	4s	8s	15s	30s	1 min	2 mins	4 mins	8 mins
1s	2s	4s	8s	15s	30s	1 min	2 mins	4 mins	8 mins	15 mins
2s	4s	8s	15s	20s	1 min	2 mins	4 mins	8 mins	15 mins	30 mins
4s	8s	15s	30s	1 min	2 mins	4 mins	8 mins	15 mins	30 mins	1 hour
8s	15s	30s	1 min	2 mins	4 mins	8 mins	15 mins	30 mins	1 hour	2 hours

	<b>Aperture area of the lens</b>	<b>Optical density</b>	<b>Reduction f-stop</b>	<b>% trasmittance</b>
<b>ND0</b>	1	0.0	0	100%
<b>ND2</b>	1/2	0.3	1	50%
<b>ND4</b>	1/4	0.6	2	25%
<b>ND8</b>	1/8	0.9	3	12.5%
<b>ND16</b>	1/16	1.2	4	6.25%
<b>ND32</b>	1/32	1.5	5	3.125%
<b>ND64</b>	1/64	1.8	6	1.563%
<b>ND128</b>	1/128	2.1	7	0.781%
<b>ND256</b>	1/256	2.4	8	0.391%
<b>ND512</b>	1/512	2.7	9	0.195%
<b>ND1024</b>	1/1024	3.0	10	0.098%
<b>ND2048</b>	1/2048	3.3	11	0.049%
<b>ND4096</b>	1/4096	3.6	12	0.024%
<b>ND8192</b>	1/8192	3.9	13	0.012%



*Caption 06: The optical quality of ND Marumi filters is such that it is possible to mount on the lens even four at the same time*



*Caption 24: for the shooting we have used a carbon tripod Manfrotto 190CXPRO4, with a three movements head with micrometric control (MHXPRO-3WG). We have disabled the VR system on the camera and we have used the manual focus and activated the intentional Mirror Up. We have used the Nikon Wireless Remote Control e ML-L3 as remote shutter release.*



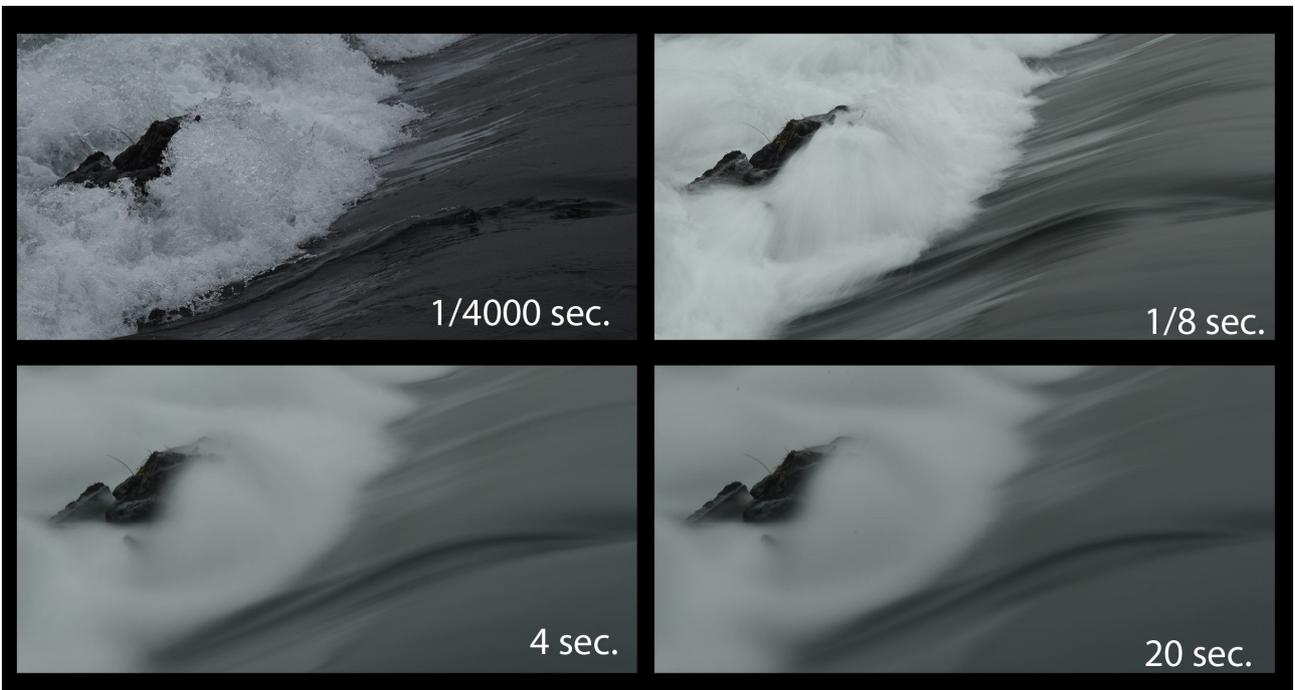
*Caption 25: The lens hood avoids the reflections on the surface of the filter*



*Caption 28: We have tried to mount in series four ND Marumi filters without detecting loss of detail in the image. The glove on the pentaprism as allowed us to avoid light leaks in the eyepoint that could have distort the exposition measure.*



*Caption: We have also used the Marumi Variable Filter ND2-ND400: this filter exploits the polarization principle and can be used in most situations but avoiding the greater absorption density with the wide lenses. Here the filter is adjusted on the minimum absorption value, ND2.*



*From 1/4000 sec to 20 sec.*



*1/500 sec.; f/10, ISO 800. Focal lens: 16mm.*



*2,5 sec.; ISO 100; Marumi filter ND64x; focal lens: 16mm*