

## Neutral Density Filters

Hoya Type Notation	B+W Type Notation	Optical Density	Filter Factor	f-Stop Reduction
ND2	ND 0,3	0.3	2	1 (-1ev)
ND4	ND 0,6	0.6	4	2 (-2ev)
ND8	ND 0,9	0.9	8	3 (-3ev)
ND16	ND 1,2	1.2	16	4 (-4ev)
ND32	ND 1,5	1.5	32	5 (-5ev)
ND100	ND 2,0	2.0	100	6 2/3 (-62/3ev)
ND400	ND 2,6	2.6	400	8 2/3 (-82/3ev)
ND1000	ND 3,0	3.0	1,000	10 (-10ev)
ND10000	ND 4,0	4.0	10,000	13 1/3 (-131/3ev)
ND100000	ND 5,0	5.0	100,000	16 2/3 (-162/3ev)

### Equations:

1. Filter Factor =  $2^x$  where x is the reduction in f-stops

2. Reduction in f-stops =  $\log_{10} \text{Filter Factor} / \log_{10} 2$

3. Optical Density =  $\log_{10} \text{Filter Factor}$

4. Reduction in f-stops =  $\text{Optical Density} / \log_{10} 2$

### Example:

For a “big stopper” ND10000 filter, the reduction in f-stops would be:

reduction in f-stops =  $\log_{10} \text{Filter Factor} / \log_{10} 2$  (from 2. Above)

reduction in f-stops =  $\log_{10} 10,000 / \log_{10} 2$

reduction in f-stops =  $4 / 0.30103$

reduction in f-stops = 13.28

(nearest f-stop in thirds of a stop would be 13 1/3)

For multiple filter stacking just add the filter factors together, but beware of vignetting on wide angle lenses.