

FILTERS

Filters are often required for working with film, but their use is less critical when working in digital photography, due to the custom white balance available on many digital cameras. A polarizer may still be very helpful when working in digital photography.

Because filters absorb some of the light, exposure must be increased. The amount of increase of exposure required for any given filter is called a **filter factor**. Correct exposure is important when using filters. Underexposure tends to exaggerate the filter effect and over-exposure tends to reduce the effect. According to its color, a filter will absorb some of the colors of the light entering the lens and pass other colors, exercising selective control of the spectrum. The deeper the color of a filter then the stronger its absorption power. **Filter factors** are multipliers. These numbers represent the amount the exposure must be increased when a particular filter is used. There are three ways to figure proper exposure depending on whether you wish to change the time of the exposure, the f-stops, of the ISO speed. The easiest method is that of changing the film speed. Remember the speed will always be decreased by a filter, never increased.

To find the new ISO speed, divide the normal ISO speed by the filter factor.

Filter factors are expressed numerically in whole numbers or numbers and fractions thereof.

A film rated at ASA 400 with a red filter calling for a filter factor of 8 would be 400 divided by 8:

$$ISO = 50$$

(In this case use of a darker filter produces a significant loss of speed.)

An exposure meter does not respond to color filters in the same manner as a specific film so the filter shouldn't be placed over the light meter to obtain a reading of extreme accuracy if desired. **Since most of your cameras have behind the lens light meters, they will automatically compensate for the filter factor.**

If you prefer to change the aperture or shutter speed, rather than the ISO, proceed as follows to locate the appropriate increase in exposure:

Since both the scale of shutter speeds and f-stops double or halve the exposure and the filter factors are multipliers, a factor of 2 is a doubling of exposure, or one stop on the scale, and a factor of 4 is 2x2, or two additional stops of exposure.

Therefore, if there is a factor of 16, then multiply as follows:

$$2 \times 2 = \quad 4 \times 2 = \quad 8 \times 2 = \quad 16$$

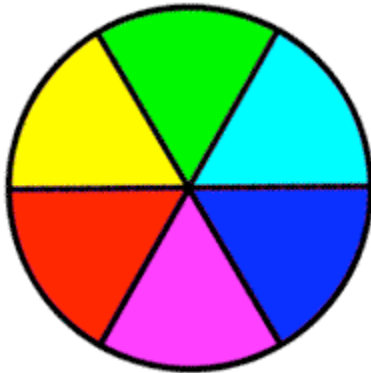
1 stop 2 stops 3 stops 4 stops

So for every multiplier of 2 there is an increase of 1 f-stop or a decrease (a halving) in speed.

A filter with a filter factor of 8 requires three additional stops of exposure.
 A filter with a filter factor of 4 requires two additional stops of exposure.

A filter with a filter factor of 2 requires one additional stop of exposure.

A FILTER BLOCKS ITS COMPLEMENT AND ALLOWS ITS OWN COLOR TO PASS. WHITE LIGHT IS COMPOSED OF RED, GREEN, AND BLUE LIGHT WHICH MIX TO CREATE OTHER COLORS SUCH AS CYAN, MAGENTA, AND YELLOW.



BLUE/ R+G = YELLOW YELLOW absorbs BLUE

GREEN/ R+B = MAGENTA MAGENTA absorbs GREEN

RED/ G+B = CYAN CYAN absorbs RED

In the presence of daylight, colored light will produce a shadow which holds the cast of its complement.

Yellow light produces blue shadows, magenta light produces green shadows, and cyan light produces red shadows.

COLOR TEMPERATURE CHANGES THROUGHOUT THE DAY



early morning / warm, yellow light



midday / more neutral light



late afternoon / warm orange-red light



evening / mixed light

TYPES OF FILTERS:

Color Compensating, Color Conversion, Light Balancing, and Special Effects.

1) COLOR COMPENSATING or CC FILTERS :

GELATIN (or plastic) filters are used for modest color correction, specifically in the case of critical color reproduction. For example, Ektachrome film may render subjects too blue, so a yellow filter (such as 10Y) may be used to filter out the blue cast.

2) COLOR CONVERSION FILTERS:

80, 85 used when mixing films and lighting of different color temperature

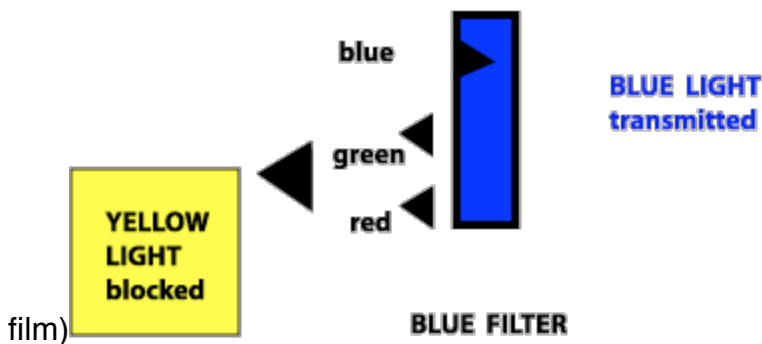
80 series filter

converts daylight film to tungsten or orange lighting .

Daylight film used under tungsten lighting will appear orange unless a blue filter is used to filter out the excessive warm light.

80A daylight to tungsten: 5500K film converts to 3200 K lighting (lose two stops)

blue filter blocks yellow light (a mixture of red and green); transmits blue light (for daylight



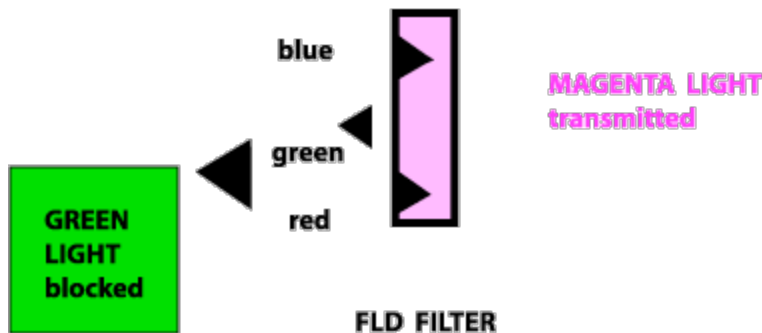
85 series filter convert tungsten film for use under daylight illumination. 85B filter provides a more dramatic shift.

Tungsten film used under daylight will appear blue unless an amber (light orange) filter is used to filter out the excessive cool light. Tungsten films can be used outdoors--3200K film converts to 5500K lighting. This amber filter blocks primarily blue and some green light, while transmitting yellow light primarily.

3) LIGHT BALANCING FILTERS

81, 82, FLD, FLB

FLD/FLB: fluorescent light: No films are balanced for use under green, fluorescent light (although Fuji Reala is designed for exposure under fluorescent light). For daylight film use an FLD filter. For tungsten film use an FLB filter. --lose one stop
The fluorescent filters are magenta in coloration allowing magenta light (a mixture of blue and red) to pass and blocking the excessive green fluorescent light.



81/ 82 series for modest color temperature shifts

warming and cooling filters: the terms warm and cool are used subjectively here

--technically 5500K may appear more blue (subjectively cool) but the temperature is "hotter" is measured in color temperature (as in the blue center of a flame)

82 series cools the warm light that appears late in the day or when working under orange/red illumination.

82A: cools by 200 degrees Kelvin with a 1/3 stop change in exposure

81 series warms the color of the light when working with strobes or on-camera flash.

The filter is also helpful in terms of warming the excessive blue cast in shadows when photographing in open shade. Yellow morning light will produce blue, cool shadows--blue is the complement of yellow.

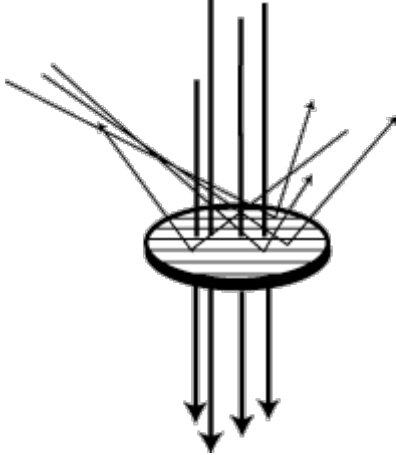
81B: warms 300 degrees Kelvin with only 1/3 stop change in exposure

4) SPECIAL EFFECTS FILTERS:

POLARIZER:

A polarizer is used frequently **to reduce reflections** on glass, metal or water, to increase color saturation, and **to reduce atmospheric haze** and glare. The filter will prompt the loss of 1-1/3 stops to 1-2/3 stops depending on degree of rotation of rings. A polarizing filter allows only light rays of a given specific angle (parallel to the screen of aligned crystals) and omits any other rays from passage through the filter. The lens should be pointed an a 35 degree angle to maximize the polarizing effect when photographing shiny surfaces.

Linear polarizers are used on manual cameras while circular polarizers are used on autofocus cameras. The more expensive circular polarizer is used for cameras which have a semi-transparent mirror or a partially silvered split prism that siphons off light for the TTL metering system--such as the Leica, Minolta Maxxum, and Nikon automatic cameras.



5) FILTERS FOR BLACK AND WHITE FILM:

Black and White Photography: One can photograph colored objects with more accurate value translation to black and white film by using a filter.

A standard yellow (K2 or Y2) filter blocks the sky's blue light, rendering blue areas darker in the final print.

Most black and white film emulsions are over-sensitive to blue light, and tend to produce a light value sky in the final print. The Kodak TMAX films are designed to be less blue-sensitive than most black and white films, so use of a yellow filter may not be required when using those emulsions. If you do not have through-the-lens metering, open one stop. The yellow filter is one of the most common filters used in black and white landscape photography.

A yellow green filter improves the rendering of color in the **studio under tungsten lighting** by removing excess red. Increase exposure by two stops.

