



SPECTRA^{PLUS}TM

Color Enhancement Filter

SPECTRA^{PLUS}TM is a triple band-pass, interference filter coating that enhances color and improves overall spectral performance. This filter benefits color imaging systems as well as applications where the eye is the detector. The coating allows transmission of the three bands of pure color – red, green, and blue – while blocking those intermediate wavelengths that distort the perception or recording of color. It also eliminates wavelengths in the ultraviolet and near infrared which are detrimental to an accurate color rendering and visual record.

SPECTRA^{PLUS}TM offers accurate hue, enhanced saturation, increased color signal-to-noise, and a resulting improved Modulation Transfer Function (MTF).

All sensors – human eye, film, and electro-optical – have limitations in how they "see" and record color. Their receptors significantly overlap, as do the wavelengths for the three prime colors of light: red, green, and blue. The human eye has optimal peaks at which it sees the three prime colors. Wavelengths between those peaks are "interpreted" as being a certain color, demonstrating the subjectivity of human color perception. Similarly, all still and motion picture films have three emulsion layers designed to detect wavelengths of the three prime colors. Overlapping wavelengths contribute confusing information to the recording of the scene's color on film. Imaging sensors, such as CCDs, experience similar problems. These systems utilize prisms and filters to divide the spectrum into bands of color which then activate individual

pixels in a large or distinct array. Wavelengths of overlap between the bands cause confusion as to whether a pixel should be red, green, or blue. In addition to these regions of "crossover confusion" between the prime colors, ultraviolet and infrared wavelengths contribute confusing spectral information in certain sensors. For the color image to be accurately recorded in sharpness, hue, and saturation, these wavelengths in the UV and IR must be attenuated as well.

SPECTRA^{PLUS}TM blocks wavelengths between prime colors, as well as blocking UV and near IR.

All optical imaging systems suffer from dispersive and resulting chromatic aberrations that limit the ability to record the color image of an object with precision. The ideal lens allows only a single wavelength of color to reach the sensor. Modern lenses use multiple optical glasses of different dispersion to permit sharp and accurate images at up to three wavelength bands. Lenses are designed to select the peaks of the three prime colors and focus them on a common image plane. As a result, wavelengths other than pure red, green, and blue are not well focused.

SPECTRA^{PLUS}TM alleviates color registration problems.

Omega Optical manufactures two SPECTRA^{PLUS}TM coating designs – one is optimized for digital imaging sensors (XB29) and one is optimized for the human eye and film (XB30). All filters are finished to the highest imaging quality standards and are available in stock and custom sizes.

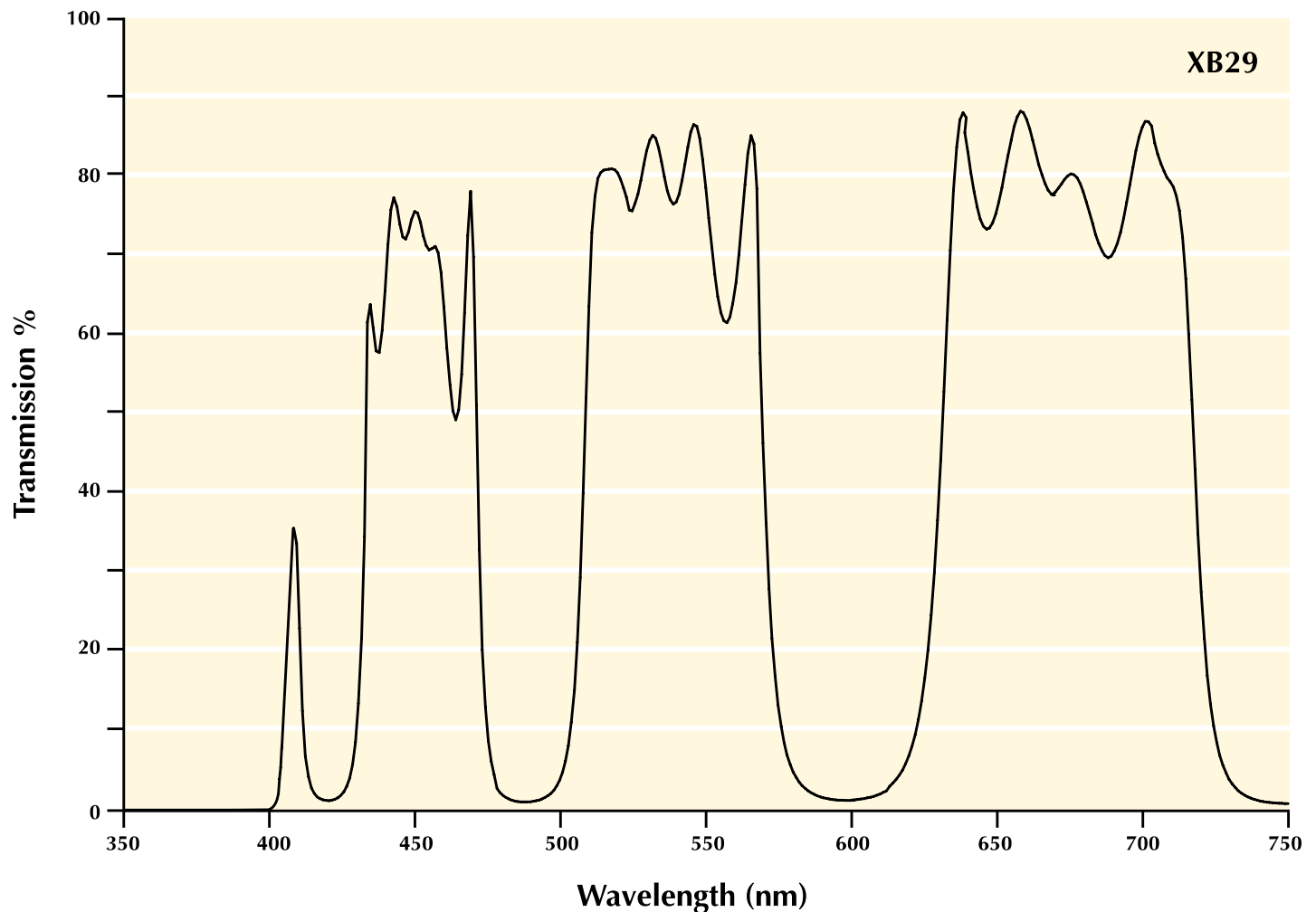
Overview

The SPECTRA^{PLUS}™ XB29 filter is specifically designed for use with digital imaging systems and CCD-based cameras. These systems are sensitive to wavelengths beyond the visible which contribute no useful information for color imaging. This version of SPECTRA^{PLUS}™ blocks the crossover regions between blue/green and green/red centered at 490nm and 600nm respectively. To prevent IR saturation of silicon-based sensors, the coating provides a high degree of attenuation in the near infrared region, from 750nm to 1100nm. The XB29 also offers complete attenuation of ultraviolet A, B, and deep blue up to 430nm. These wavelengths may seriously impact apparent color and reduce image sharpness.

Applications

SPECTRA^{PLUS}™ XB29 has application in the optical systems of video cameras, remote sensing cameras, digital cameras for still photography, machine vision systems, and CCTV cameras. It eliminates the need for a red blocking filter, typical of CCD cameras. The XB29 is also appropriate for use in any color reproduction process based on digital sensor technology. These applications include pre-press scanners in the commercial printing industry, and desktop scanners and color copiers in the office products industry. As with all interference filters, the coating is most efficient across the entire field of view when the transmitted light is at an angle of incidence no greater than 30°.

Spectral Performance



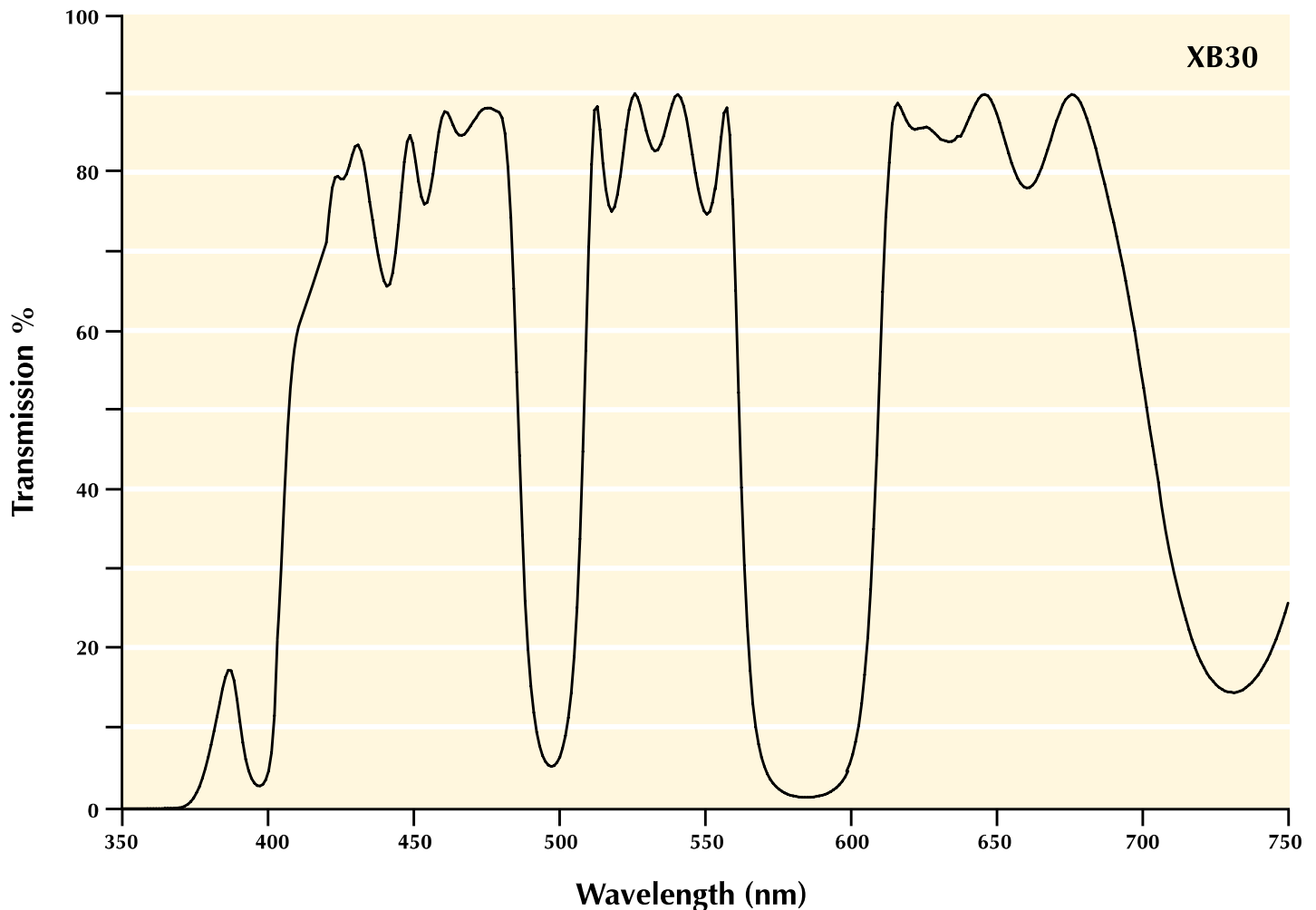
Overview

The SPECTRA^{PLUS}™ XB30 filter is optimized for applications where the human eye or photographic film is the detector. Color imaging is enhanced, with increased saturation, accurate hue, and improved contrast and resolution. This version of the SPECTRA^{PLUS}™ filter has two stop band regions centered at 490nm and 580nm for blocking the prime color “crossover” wavelengths between blue/green and green/red in the visible spectrum. The XB30 offers high attenuation of ultraviolet A & B. It also attenuates the near infrared in a band centered at 725nm.

Applications

SPECTRA^{PLUS}™ XB30 has numerous applications in the photography, film, and video industries including: video, motion picture, and slide projection; photography, film, and video lenses; and enlarger lenses. In lenses the coating can be applied to lens elements or used as a discrete filter, both at slightly increased exposure time or lens aperture. In the architectural and theatrical lighting industries the filter can be used as a fixture filter or as a coating on bulbs or reflectors. It also has use in medical and dental lighting. The coating improves “seeing” in ski goggles, sports eyewear, sunglasses, and sports optics especially in low light and flat light conditions. The filter is most effective in applications where the light is collimated, striking the filter at angles of incidence less than 30°.

Spectral Performance





SPECTRA^{PLUS}TM

Color Enhancement Filter

PERFORMANCE

Enhances color saturation
Provides accurate hue
Increases color signal-to-noise
Improves Modulation Transfer Function (MTF)

Triple bandpass interference filter
Transmits bands of pure color – R,G,B
Blocks crossover bands between R,G,B
Attenuates ultraviolet
Attenuates near infrared

APPLICATIONS

SPECTRA^{PLUS}TM XB29 DIGITAL IMAGING

Commercial Printing Industry
Pre-Press Scanners
Machine Vision Industry
Camera Systems
Office Products Industry
Desktop Scanners
Color Copiers
Digital Copiers
Photography-Video-Film Industries
Video Cameras & Lenses
Digital Cameras & Lenses
Photo Scanners
Remote Sensing Industry
Camera Systems

SPECTRA^{PLUS}TM XB30 EYE & FILM

Eyewear & Sports Eyewear Industries
Sunglasses
Ski Goggles
Active Sports Glasses
Lighting Industry
Track Fixture Filter
Fiber Optic Filter
Bulb & Reflector Coating
Medical & Dental Lights
Photography-Video-Film Industries
Camera Lenses
Video, Film & Slide Projectors
Color & B&W Film Printers
Enlarger Lenses
Sports Optics Industry
Binoculars & Spotting Scopes
Rifle Scopes

PATENT

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