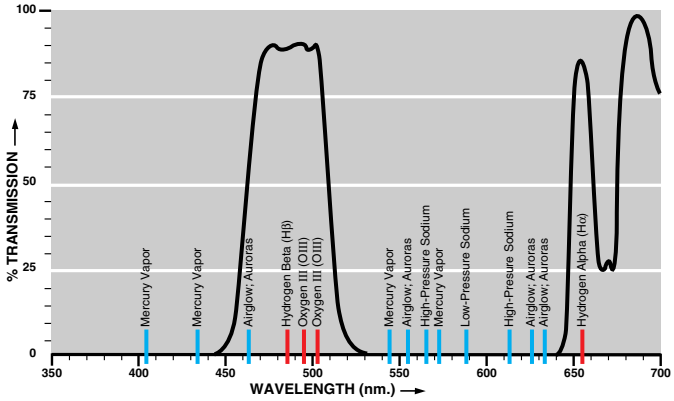
Meade® Series 4000™ Broadband Nebular Filters

For dramatic increase in visual and photographic detail in deep-space emission and reflection nebulae.

Meade Series 4000 Nebular Filters incorporate the very latest in interference coatings technology. Each filter includes more than 40 coating layers to reject, with precision, unwanted light from urban light pollution while passing critical nebular emissions with minimal reduction.

Technical Basis of the Meade Broadband Nebular Filter: As shown in the transmission graph below, the Meade Broadband Nebular Filter strongly rejects the light of sodium- and mercury-vapor lights as well as natural airglow and auroral emissions. Conversely, the strong nebular emission spectral lines, transmitting in the visually sensitive regions primarily at 486nm (Hydrogen Beta, or Hβ) and 496 to 501nm (Oxygen-III, or OIII), are passed through the filter with high transmission percentages. The effect of the filter is that nebular light reaching the eye is observed visually in dramatically increased detail, while the effects of unwanted city lights are greatly reduced. The Meade Broadband Filter also passes photographically-important Hydrogen Alpha (Hα) nebular light at 656nm largely unattenuated, making the filter a valuable aid in the photography of deep-space emission nebulae as well. The contrast between galaxies and the night-sky backdrop is also typically enhanced by the filter, but because galaxies emit light in a much broader range of wavelengths than nebulae, the effect is generally not as dramatic in these cases.

Wavelength *vs.* Transmission graph of the Meade Broadband Nebular Filter. Undesirable spectral lines (suppressed by the filter) are indicated by blue lines on the horizontal axis; desirable spectral lines (passed by the filter) are shown in red.



Two models of Broadband Nebular Filters are available:

#908B: Threads into the barrels of all Meade 1.25" eyepieces, and into the barrels of virtually all other 1.25" eyepiece brands as well. Clear aperture is 26mm.

#911B: Threads onto the rear cells of Meade LX-series mirror-lens telescopes *(pp. 18 - 49)* and onto Meade *ED* Apochromatic Refractors (using the Universal Thread Adapter, p. 66), as well as to the rear cells of other Schmidt-Cassegrain brands. In this way the telescopes are converted into a basic "nebular mode," for visual observing or for photography with the T-Adapter or Off-Axis Guider. Clear aperture is 36mm.

Meade® Series 4000™ Narrowband Nebular Filters

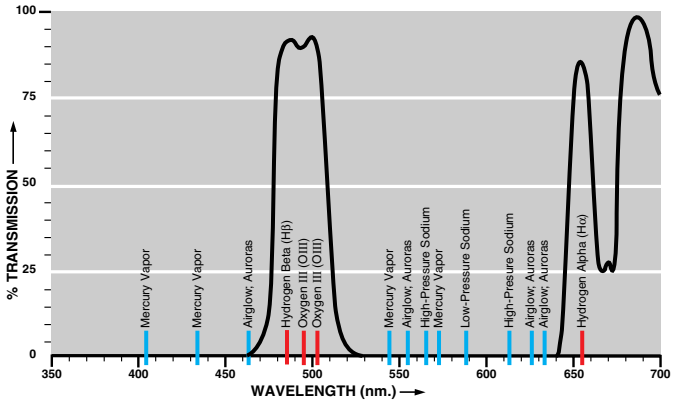
A remarkable advance for the serious visual observer of emission nebulae.

Unlike the wide transmission band characteristics of the Broadband Nebular Filters, Meade Narrowband Filters zero in on the three most important visible wavelengths emitted by deep-space emission nebulae: the two spectral lines of Oxygen III at 496 and 501nm and the Hydrogen Beta line at 486nm. Virtually all unwanted city light emissions are rejected by factors of 99.9+%.

Because of its narrow bandpass characteristics, the Narrowband Nebular Filter achieves striking levels of contrast between the nebula itself and the surrounding dark-sky environment: objects such as the Orion Nebula (M42), the Lagoon Nebula (M8), and the Omega Nebula (M17) are observed as they would normally appear through telescopes of several inches larger aperture. Tenuous, faint outer extensions of these objects now become readily observable—often to the point where the visible mass of the nebula is more than doubled in diameter. Planetary nebulae such as the Ring Nebula (M57), the Dumbbell

Nebula (M27), and the Saturn Nebula (NGC 7009) similarly display dramatically-heightened levels of contrast and observable detail. Faint, insignificant patches of nebulosity that heretofore were near the limit of observability are now viewed with ease.

Wavelength *vs.* Transmission graph of the Meade Narrowband Nebular Filter. Used at low to medium magnifications, narrowband filters significantly increase observable detail on specialized objects.



The Meade Narrowband Nebular Filter should be viewed as a complement to, not as a substitute for, the Broadband Filter on the opposite page. The Broadband Filter enhances the performance of a much wider range of nebular objects; the Narrowband Filter improves contrast and visible detail on fewer objects, but in these more limited cases it does so to a most dramatic level. Because of the very narrow range of total light energy transmitted, the Narrowband Filter is not intended as a photographic filter. Visual effects of the Narrowband Filter are most pronounced when the filter is used with eyepieces of 25mm focal length and longer.

#908N: Threads into the barrels of all Meade 1.25" eyepieces and most other 1.25" brands. Clear aperture: 26mm.

#911N: Threads onto the rear cells of Meade LX-series mirror-lens telescopes *(pp. 18 - 49)* and onto Meade *ED* Apochromatic Refractors, using the Universal Thread Adapter, p. 66. Also threads to other brands of SCT's as well. Clear aperture: 36mm.

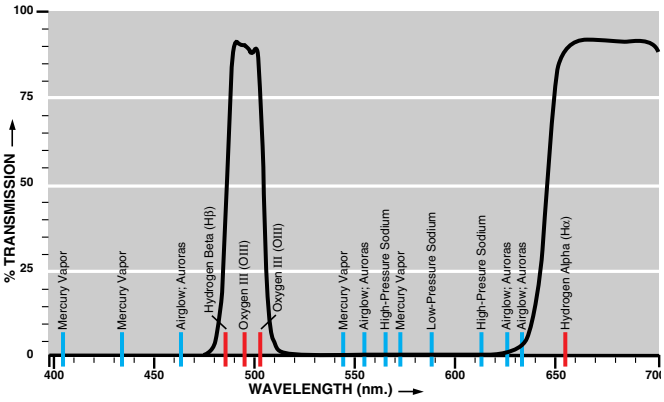
Meade® Series 4000™ Oxygen-III Nebular Filters

For the observation of diffuse emission and planetary nebulae.

Meade Oxygen-III (O-III) nebular filters provide an extraordinary level of nebular filtration on diffuse and planetary nebulae. Observations of these nebulae in a city environment with the O-III filter often yield more image contrast than observations of the same objects in a dark-sky setting without the filter.

The O-III filter extracts more than 80% of the light emanating from the two oxygen-III spectral lines at 496 and 501nm. Objects such as the Omega (Swan) Nebula (M17) in Sagittarius, the Orion Nebula (M42) in Orion, the Helix Nebula (NGC 7293) in Aquarius, and the Eagle Nebula (M16) in Serpens are revealed in dramatically increased detail. Meade 60-layer interference coating technology isolates the desirable O-III lines, while attenuating other spectral lines virtually to zero. As with Meade Narrowband Filters *(above),* the O-III Filters are complements to other Meade nebular filters; the effectiveness of each filter type is highly dependent on the physical characteristics of the particular nebula being observed.

Wavelength *vs.* Transmission graph of the Meade Oxygen-III Nebular Filter. The O-III filter transmits high percentages of the Oxygen-III wavelengths while attenuating other undesirable wavelengths.



#908X: Threads into the barrels of all Meade 1.25" eyepieces and most other 1.25" brands. Clear aperture: 26mm.

#911X: Threads onto the rear cells of Meade LX-series mirror-lens telescopes *(pp. 18 - 49)* and onto Meade *ED* Apochromatic Refractors, using the Universal Thread Adapter, p. 66. Also threads to other brands of SCT's as well. Clear aperture: 36mm.