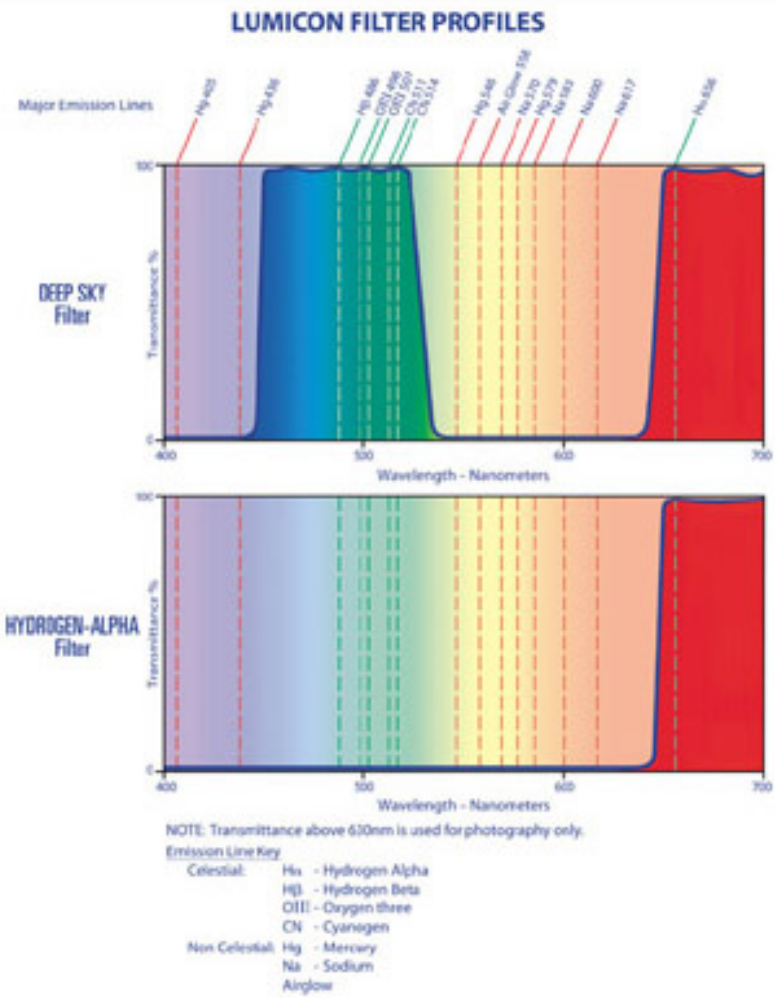
Filter Specifications & Uses

LUMICON Nebula Filters

The Deep Sky , Hydrogen-Beta , Oxygen III , and Ultra High Contrast Filters are the result of 20 years of steady design improvements, and continue to deliver the highest performance of all anti-light pollution filters obtainable today. The following information recommends which filter to use on which celestial objects, and explains how filter transmissions differ.

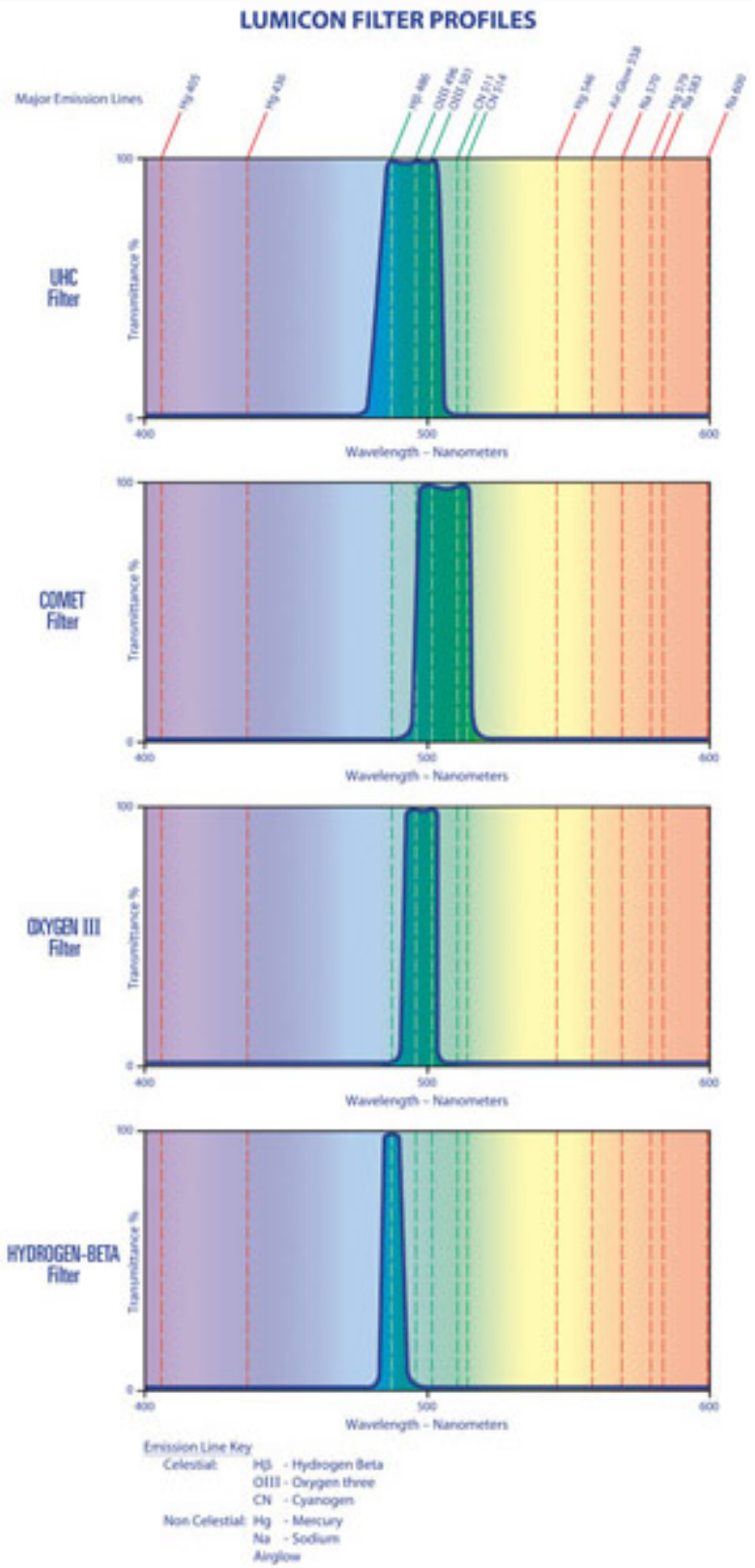
Objects	Examples	Best Filter for Viewing	Best Filter for Photography
Stars & Star Clusters	M13, M11	Deep Sky	Deep Sky
Diffuse Nebulae	Lagoon, Swan	OIII (light polluted sky) Deep Sky, UHC (dark sky)	Deep Sky
Planetary Nebulae	Dumbbell, Ring	OIII (light polluted sky) Deep Sky, UHC (dark sky)	Deep Sky
Faint Planetary Nebulae	NGC 7293, Abell 33, Jones 1	OIII	Deep Sky
Reflection Nebulae	Pleiades, Trifid	Deep Sky	Deep Sky
Spiral Galaxies	M33, M101	Deep Sky	Deep Sky
Faint Nebulae	Veil, Rosette, N. American	OIII (light polluted sky) Deep Sky, UHC (dark sky)	Deep Sky
Extremely Faint Nebulae	California, Horsehead	H-Beta	Night-Sky H-Alpha Deep Sky

Ideal for Photographic Applications



[Click Here to Enlarge Image]

Ideal for Visual Usage



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Deep Sky Filter

- **Intended for viewing nebulae from light-polluted skies.**
- **Blocks all mercury vapor and high & low pressure sodium vapor lamp light, neon lights and airglow, while transmitting the rest of the visible spectrum.**
- **The best all-around visual light pollution filter for use in urban skies.**
- **This filter also provides high-contrast views of the Martian polar caps**

Ultra High Contrast Filter

- **Narrow band pass filter (24nm) isolates the two doubly ionized oxygen lines (496 and 501nm) and the hydrogen-beta line (486nm) emitted by planetary and most emission nebulae.**
- **Provides superb views of the Orion, Lagoon, Swan and other extended nebulae.**
- **The best all-around dark-sky nebular filter available.**

Oxygen III Filter

- **Narrow band pass filter (11nm) isolates just the two doubly ionized oxygen lines (496nm and 501nm) emitted by planetary and extremely faint nebulae.**
- **Produces near-photographic views of the Veil, Ring, Dumbbell, Orion, plus many other nebula.**

Hydrogen-Beta Filter

- **Extremely narrow bandpass filter isolating the hydrogen-beta line alone (486nm).**
- **Excellent for viewing the Horsehead, Cocoon and California Nebulae.**
- **Often the only way to view certain nebulae.**
- **It is best used under clear skies with large aperture.**

Exit Pupil Specifications:

The exit pupil of a telescope is a measure of specific magnification, which differs from absolute magnification, and which determines the surface brightness of an extended object image. Exit pupil diameter may be expressed as the quotient of eyepiece focal length divided by the telescope's focal ratio. For example, a 32mm eyepiece used on an f/10 telescope will have a 3.2mm exit pupil. Each Lumicon filter has an optimum eyepiece exit pupil range shown below.

Filter Type	Deep Sky	UHC	OIII	H-Beta

Bandpass	90nm	22-26nm	10-12nm	8-10nm
Optimum Exit Pupil (Light-polluted sky)	0.5-2mm	1-4mm	2-5mm	3-7mm
Optimum Exit Pupil (Dark sky)	1-4mm	2-6mm	3-7mm	4-7mm

Notice:

As filter bandpass decreases, optimum exit pupil size tends to increase. To determine the best eyepiece focal length to use with a given filter, simply multiply the Exit Pupil value shown above by your telescope's focal ratio. For example, if you are using the Lumicon H-Beta filter at a dark site and your telescope has an f/6 focal ratio, the best range of eyepiece focal lengths to use with this filter is [(4 to 7) x 6] = 24mm to 42mm.

Filter Construction:

Lumicon nebula filters are made using thin-film dielectric coatings on optically flat glass. These exclusively designed dielectric coatings consist of over 30 alternating layers of several different materials. Each layer is about a wavelength of light thick and has a thickness accurate to 2 - 3 angstroms. The Deep Sky Filters use very hard electron-beam deposited coatings on one side of the glass substrate, and delicate anti-reflection coatings on the other. Except for the Deep Sky Filter, all Lumicon filter coatings are very hard, and may be cleaned carefully with alcohol. The UHC, OIII, and H-Beta filters consist of two elements, sandwiched coatings, and anti-reflection coatings on all surfaces to prevent ghosting.

Mechanical Design:

These filters thread directly into most eyepieces and telescope accessories. Threads are standard for 1¼" filters. 48mm filters are standard for 2" O.D. eyepieces.

Bandpass:

These Lumicon filters reject man-made and natural light pollution. Mercury light pollution occurs at 365, 405, 436, 546, 577, and 617nm. High-pressure sodium streetlights emit at 570, 583, 600, and 617nm. Natural airglow occurs at 558 and more weakly at 630nm. There is a window of greatly reduced light pollution from 440nm (blue) to 540nm (green). The Lumicon Deep Sky Filter has a wide 90-100nm bandpass for most of this range (441-535nm) to yield maximum transmission of light from stars and galaxies. The UHC Filter has a narrow 22nm bandpass through 484-506nm. The OIII Filter has a very narrow 11nm bandpass for 495-501nm, and the H-beta Filter has the narrowest bandpass of all - only 8nm centered at 486nm. The narrower the bandpass, the higher the rejection of light pollution and the blacker the skies. However, a narrower bandpass also means fainter star images. Nevertheless, the Deep Sky Filter has high transmission for the photographic red nebula emission lines.

Nebula Emission Lines:

The main visible radiation from emission nebulae consists of doubly ionized oxygen near the wavelength of 500nm. There is also weaker emission due to hydrogen-beta at 486nm. The invisible but photographically important emission of red hydrogen-alpha and ionized nitrogen occur near 657nm.

LUMICON Color and Neutral Density Filters

The Lumicon Color and Neutral Density Filters are made from renowned Schott and Hoya optical glass and allow for maximum contrast on viewing planetary and lunar detail. Individually precision ground, highly polished with maximum light transmission coatings on both sides, these filters are 100% guaranteed for life.

#8 Light Yellow
Moon: Feature Contrast
Mars: Maria
Jupiter: Belts
Jupiter: Orange-Red Zonal
Uranus: Dusky Detail
Neptune: Dusky Detail

#11 Yellow-Green
Mars: Maria
Jupiter: Clouds
Jupiter: Red/Blue Contrast
Saturn: Clouds
Saturn: Cassini Division
Saturn: Red/Blue Contrast

#12 Yellow
Moon: Feature Contrast
Mars: Blue-Green Areas
Jupiter: Red-Orange Features
Saturn: Clouds
Saturn: Red-Orange Features

#15 Dark Yellow
Moon: Feature Contrast
Mars: Clouds
Mars: Polar Caps
Jupiter: Belts
Saturn: Belts
Uranus: Dusky Detail
Neptune: Dusky

Detail #21 Orange
Mars: Maria
Jupiter: Belts

#25 Red
Mercury: Features
Venus: Planet/Sky Contrast
Venus: Terminator
Mars: Maria
Mars: Polar Caps
Jupiter: Belts
Jupiter: Galilean Moon Transits
Saturn: Clouds

#29 Dark Red
Mercury: Features
Venus: Planet/Sky Contrast
Venus: Terminator
Mars: Maria
Mars: Polar Caps
Jupiter: Belts
Jupiter: Galilean Moon Transits
Saturn: Clouds

#38A Dark Blue
Venus: Clouds
Mars: Dust Storms
Jupiter: Belts
Jupiter: Great Red Spot
Jupiter: Disc
Saturn: Belts

#47 Violet
Venus: Clouds
Mars: Polar Caps
Saturn: Rings

#56 Light Green
Moon: Detail

#80A Blue
Moon: Feature Contrast
Jupiter: Belts
Jupiter: Rilles
Jupiter: Festoons
Jupiter: Great Red Spot
Saturn: Belts
Saturn: Polar Regions

#82A Light Blue
Moon: Low-Contrast Features
Mars: Low-Contrast Features
Jupiter: Low-Contrast Features
Saturn: Low-Contrast Features

ND13 Neutral Density
13% Transmission
Moon: Glare Reduction
Double Stars: Bright Primary

ND25 Neutral Density
25% Transmission

ND50 Neutral Density
50% Transmission

Single Polarizing Filter

Rotating Polarizing Filter
Moon: Glare Reduction or
Variable Transmission

Jupiter: Polar Regions
Saturn: Belts
Saturn: Polar Regions

Mars: Dust Storms
Mars: Polar Caps
Jupiter: Belts
Jupiter: Atmosphere
Jupiter: Red/Blue/Light Contrast

#23A Light Red
Mercury: Planet/Sky Contrast
Mars: Maria
Mars: Blue-Green Areas
Jupiter: Belts
Jupiter: Polar Regions
Saturn: Belts
Saturn: Polar Regions

#58 Green
Venus: Clouds
Mars: Polar Caps
Jupiter: Red/Blue/Light Contrast
Saturn: Belts
Saturn: Polar Regions

Object	Features	Recommended Filter
Mercury	**Planet/Sky Contrast**	**#23A Light Red**
	Features	**#25 Red** **#29 Deep Red**
Venus	**Clouds**	**#38A Deep Blue** **#47 Violet** **#58 Green**
	Planet/Sky Contrast	**#25 Red** **#29 Deep Red**
	Terminator	**#25 Red** **#29 Deep Red**
Moon	**Detail**	**#56 Light Green**
	Feature Contrast	**#8 Light Yellow** **#12 Yellow** **#15 Deep Yellow** **#80A Blue**
	Low Contrast Features	**#82A Light Blue**
	Glare Reduction	**ND13 Neutral Density**
Mars	**Clouds**	**#15 Deep Yellow**
	Maria	**#8 Light Yellow** **#15 Deep Yellow** **#11 Yellow-Green** **#21 Orange** **#23A Light Red** **#25 Red** **#29 Deep Red**

	Blue-Green Areas	**#12 Yellow** **#23A Light Red**
	Dust Storms	**#38A Deep Blue** **#56 Light Green**
	Polar Caps	**#15 Deep Yellow** **#25 Red** **#29 Deep Red** **#47 Violet** **#56 Light Green** **#58 Green** **Deep Sky Filter**
	Low Contrast Features	**#82A Light Blue**
Jupiter	**Clouds**	**#11 Yellow-Green**
	Belts	**#8 Light Yellow** **#15 Deep Yellow** **#21 Orange** **#23A Light Red** **#25 Red** **#29 Deep Red** **#38A Deep Blue** **#56 Light Green** **#80A Blue**
	Rilles	**#80A Blue**
	Festoons	**#80A Blue**
	Atmosphere	**#56 Light Green**
	Red-Orange Features	**#12 Yellow**
	Orange-Red Zonal	**#8 Light Yellow**
	Red/Blue Contrast	**#11 Yellow-Green**
	Blue/Light Contrast	**#25 Red**
	Great Red Spot	**#38A Deep Blue** **#80A Blue**
	Galilean Moon Transits	**#25 Red** **#29 Deep Red**
	Red/Blue/Light Contrast	**#56 Light Green** **#58 Green**

	Polar Regions	#21 Orange #23A Light Red
	Disc	#38A Deep Blue
	Low Contrast Features	#82A Light Blue
Saturn	Clouds	#11 Yellow-Green #12 Yellow #25 Red #29 Deep Red
	Belts	#15 Deep Yellow #21 Orange #23A Light Red #38A Deep Blue #58 Green #80A Blue
	Polar regions	#21 Orange #23A Light Red #58 Green #80A Blue
	Rings	#47 Violet
	Cassini Division	#11 Yellow-Green
	Red/Blue Contrast	#11 Yellow-Green
	Red/Orange Features	#12 Yellow
	Low Contrast Features	#82A Light Blue
Uranus	Dusky detail	#8 Light Yellow #15 Deep Yellow
Neptune	Dusky detail	#8 Light Yellow #15 Deep Yellow
Double Stars	Bright Primary	ND13 Neutral Density

Tech-Support

All Techical questions should be directed to:
tech-support@lumicon.com