

# Color Temperature Comparison of Five F4T5 Fluorescent Tubes

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For each of five, six-inch F4T5 fluorescent tubes, rated at different color temperatures, installed in a SaturnSlide™ Medium Format 3D viewer, a six Megapixel Canon S3 IS was used to photograph only the left-side 50x50mm frame of a mounted medium format stereograph (produced with 120 format Fujichrome Provia 100F, daylight balance, color transparency film).

The photographs were taken through the viewer's 78mm FL, 46mm diameter achromatic doublet lens.

The selected scene was shot in bright afternoon sunlight at an elevation of 4000 ft., in Yosemite National Park. No on-camera filters were used and the film was developed in E-6 chemistry, without pulling or pushing.

The following options were selected when shooting the stereograph with the Canon S3 IS:

Autofocus

Aperture preferred auto-exposure (selecting f/2.7, with shutter speeds varying between 1/25<sup>th</sup>, 1/30<sup>th</sup> and 1/40<sup>th</sup> sec., with slight variations in brightness of the five fluorescent tubes, using center-weighted metering)

ISO 80

Daylight Balance (vs. AWB)

Neutral Color (vs. Vivid, Sepia, B&W, etc.)

-1/3 EV compensation (to avoid blown highlights had without EV compensation)

**Rotation, cropping, and resizing were the *only* tools used in Photoshop to “normalize” the five captures.**

**The goal was to preserve the relative color casts captured by the camera, using each of the five tubes, having the following color temperatures, as rated by their manufacturers: 3000K, 4200K, 5000K, 5250K and 6500K.**

Note: No attempt was made to ensure that the color casts seen in this document accurately reproduce the color casts seen in the stereo viewer. That would be next to impossible, but great care was taken to ensure that the ***workflow was identical for each capture*** and thus, their ***relative color casts*** can be compared with a reasonable assurance of accuracy.

Lastly, keep in mind that the film, Fujichrome Provia 100F, does not record color accurately, the diffuser that sits between the fluorescent lamp fixture and the mounted transparency within the stereo viewer is also likely to be less than perfectly neutral, and your computer monitor could shift the colors as well, but none of these inaccuracies should affect your ability to compare the ***relative*** color cast of each fluorescent tube in the photos below.

Again, except for rotation, cropping and resizing, the following JPG images are just as they were captured in the Canon S3 IS, taken through the SaturnSlide viewer's lens, with no additional digital manipulations applied in Photoshop (other than the captioning seen in the lower left corners.)

On the following pages, the individual images can be examined, as well as some composite images, to facilitate comparisons.





3000K Warm White





4200K Cool White













6500K Daylight





Examine this same pairing, without the annotations, here:



Here's another pairing:





Studying the side-by-side composite images, especially the open granite surfaces of Cathedral Rocks and portions of the debarked log, here are my somewhat objective conclusions:

**3000K Warm White** has a strong red cast. This is absolutely unacceptable for viewing daylight balanced transparencies.

**4200K Cool White** has a more subtle, but still significant yellow-green cast.

**5250K Neutral White** is more neutral still, with a slight green cast (an improvement over the 4200K).

**5000K Neutral White** is almost perfect, in my opinion, and not because it's rated at exactly 5000K.

**6500K Daylight** has a blue cast (easily seen when comparing the darker portions of the log with the same areas in the 5000K image.)

Subjectively speaking, the 5000K **Toshiba FL4-EX-N-H** tube, sold only in Japan, but available via eBay, is now my favorite tube for use with Fujichrome Provia 100F transparencies. In the absence of a color cast, the colors simply “pop” - they come to life - making MF3D views more realistic than ever.

Having previously had no access to 5000K fluorescent tubes in this size, only finding them a couple of weeks ago with yet another scouring of the Internet, I had always convinced myself that our eyes can adapt to a color cast after spending a few moments immersed within a given source of illumination.

I think this is true to some extent, certainly, but there's an inescapable, residual price to pay in how the color cast dulls the energy of not just those colors that are directly opposite on the color wheel (dulling magenta subjects with a green color cast, for example), but to varying degrees, every color other than the frequency of the color cast itself, while enhancing the energy of subjects at or very close to its frequency.

I've done my best to convey within this document the relative color casts imposed by each of these five tubes, but let me add that the choice to use 5000K becomes very obvious when examining stereographs in the MF3D viewer. I concede there's room for subjectivity here, but for me, the 5000K tube allows daylight balanced color transparencies to “breathe” in a way that's just not possible at the other color temperatures.

This may not seem profound to anyone who has been using stereo viewers equipped with 5000K-rated light sources other than these 6-inch F4T5 fluorescent tubes, but I am elated to have finally found a 5000K fluorescent tube for my SaturnSlide™ and King Inn MF3D viewers.

The original, complete composite image, seen on the following page, can be downloaded with this link:

[http://accessz.com/images/Fluorescent\\_Tube\\_Comparison\\_3000\\_4200\\_5000\\_5250\\_6500K.jpg](http://accessz.com/images/Fluorescent_Tube_Comparison_3000_4200_5000_5250_6500K.jpg)







## 3000K (Soft White, a.k.a. Warm White)

### Philips 392183

Philips 392183 Linear Fluorescent 4-Watt 6-Inch T5 Soft White Light Bulb

<http://www.amazon.com/gp/product/B002CZ38FK>

Product Number	392183
Full product name	F4T5 Soft White 6
Ordering Code	F4T5/SOFT WHITE
Pack type	1 Lamp
Pieces per Sku	1
Skus/Case	12
Pack UPC	046677392185
EAN2US	
Case Bar Code	50046677392180
Successor Product number	
System Description	Preheat
Base	Miniature Bipin
Base Information	Aluminum [Aluminum Base]
Bulb	T5
Packing Type	1LP [1 Lamp]
Packing Configuration	12
Life with 3h/day use [years]	3an
Type	F4T5
Rated Avg. Life [3 hr Start]	6000 hr
Ordering Code	F4T5/SOFT WHITE
Pack UPC	046677392185
Case Bar Code	50046677392180
Watts	4W
Color Code	830 [CCT of 3000K]
Color Rendering Index	85 Ra8
Color Description	Soft White
Color Temperature	3000 K
Initial Lumens	150 Lm
Design Mean Lumens	120 Lm
Nominal Length [inch]	6
Product Number	392183



## 4200K (Cool White)

### SYLVANIA 20416

SYLVANIA 20416 - F4T5/CW - 4 Watt Fluorescent Tube - T5 Linear Fluorescent Tube - 4200K

<http://www.amazon.com/SYLVANIA-20416-Fluorescent-Linear-4200K/dp/B001DHK8WY>

Product Information	
Abbrev. With Packaging Info.	F4T5CW 24/CS 1/SKU
Actual Length (in)	5.91
Actual Length (mm)	150.1
Average Rated Life (hr)	6000
Base	Miniature Bipin
Bulb	T5
Color Rendering Index (CRI)	60
Color Temperature/CCT (K)	4200
Diameter (in)	0.63
Diameter (mm)	16.0
Industry Standards	ANSI C78.901 - 2001
Initial Lumens at 25C	135
Mean Lumens at 25C	117
Nominal Length (in)	6
Nominal Wattage (W)	4.00

Source: <https://www.1000bulbs.com/pdf/sylvania-20416-specs.pdf>

## 5000K (Neutral White)

### Toshiba FL4-EX-N-H

Sold only in Japan (but available via eBay)

Super Bright F4T5 Fluorescent G5 Bi-Pin Base 4W 5000K Neutral White New!

<http://www.ebay.com/itm/like/181842168548>

- T5 Fluorescent Tube G5 Bi-Pin Base.
- **4W F4T5 FL4-EX-N-H**
- Wattage: 4W
- Phosphor: RGB Tri-Phosphor mixture
- Type: T5 tube
- Color: 5000K Neutral White
- Length (in): 6"
- Width (in): 0.625"
- Base: G5
- Life: 6000 hours

[www.fusun-toshiba.com/catalogue/catalogue.pdf](http://www.fusun-toshiba.com/catalogue/catalogue.pdf)



## Three Band Phosphor Type Fluorescent Lamps

With 3 types of phosphor color - blue, green and red, color performance (the way that the color looks) is vastly improved and color is reproduced vividly.

Color performance, where the quality of light has become luxuriant, is obtained by these lamps with the ideal conditions to meet your needs for high quality, authenticity and nature.



**Not shown:**

L4EX-N-H	5,000	4	T-5	15.5	134.5	G5	0.162	150	6,000	90	10	3-Band Natural White
Product Order Code	Color Temperature (K)	Watts (W)	Shape	Dia (mm)	Length (mm)	Base	Rated Lamp Current (A)	Initial Lumens (lm)	Average Life (h)	Color Rendering Index (Ra)	Std. Pkg. Q'ty.	Color Description
<b>Straight Type</b>												
FL10EX-N-Z	5,000	10	T-8	25.5	330.0	G13	0.230	555	7,500	88	10	3-Band Natural White
FL15EX-N-Z	5,000	15	T-8	25.5	436.0	G13	0.300	970	7,500	88	10	3-Band Natural White
FL20T8EX-D/18*	6,500	18	T-8	25.5	588.7	G13	0.370	1,300	12,000	84	25	3-Band Daylight
FL20T8EX-N/18*	5,000	18	T-8	25.5	588.7	G13	0.370	1,350	12,000	84	25	3-Band Natural White
FL40T8EX-D/36*	6,500	36	T-8	25.5	1,198.0	G13	0.430	3,250	20,000	84	25	3-Band Daylight
FL40T8EX-N/36*	5,000	36	T-8	25.5	1,198.0	G13	0.430	3,350	20,000	84	25	3-Band Natural White
<b>Circular Type</b>												
FCL22EX-D/21*	6,500	21	T-9	29.0	210.0	G10q	0.380	1,220	9,000	84	30	3-Band Daylight
FCL32EX-D/30*	6,500	30	T-9	29.0	300.0	G10q	0.425	2,360	9,000	84	20	3-Band Daylight

Source: <http://www.fusun-toshiba.com/catalogue/catalogue.pdf>



## 5250K (Neutral White – “Natural Color Evaluation Lamp”)

Toshiba FL4N

No longer manufactured! ☹

[www.fusun-toshiba.com/catalogue/catalogue.pdf](http://www.fusun-toshiba.com/catalogue/catalogue.pdf)



### Natural Color Evaluation Lamps

The Natural Color Evaluation lamps are the world's best color rendering lamps. This is made possible by a color rendering index of Ra=99 which is above 90 and special color rendering indices of R9 to R15. The color temperature of 5,000K is closest to that of daylight and the brightness is a remarkable of 2,200 lumens.

In addition, the lamp life is long. And there is minimal heat generation and radiation compared to conventional incandescent lamps. These lamps are most suitable for application where particularly high color rendition is important, such as printing plants, art galleries and studios, department stores and many others.



Product Order Code	Color Temperature (K)	Watts (W)	Shape	Dia (mm)	Length (mm)	Base	Rated Lamp Current (A)	Initial Lumens (lm)	Average Life (h)	Color Rendering Index (Ra)	Std.Pkg.Q'ty.		Color Description
											Inner	Outer	
FL 6N-EDL	5,250	6	T-5	15.5	210.5	G5	0.147	170	5,000	99	100	600	Natural Daylight
FL10N-EDL	5,250	10	T-8	25.5	330.0	G5	0.230	370	5,000	99	25	200	Natural Daylight
FL20N-EDL	5,000	20	T-10	32.5	580.0	G13	0.360	900	5,000	99	---	25	Natural Daylight
FL40N-EDL	5,000	40	T-10	32.5	1,198.0	G13	0.420	2,250	5,000	99	---	25	Natural Daylight

Source: <http://www.fusun-toshiba.com/catalogue/catalogue.pdf>

## 6500K (Daylight)

### Triangle Bulbs T30013

Triangle Bulbs T30013 - F4T5/D, 4 Watt, T5, 6500K Daylight, 6" Straight Fluorescent Tube Light Bulb

<http://www.amazon.com/gp/product/B0141JQHIO>

- 4 watt T5 Fluorescent Daylight (6500K) light bulb
- 8,000 Life Hours
- 6 inch fluorescent tube, G5 Mini Bi-Pin Base
- 145 Lumens, CRI: 85
- F4T5/D Day-Light