

Lighting Your Carpets

Definition of Terms:

Light: Light is the band of radiation that allows us to perceive color and is composed of many different wavelengths that correspond to specific colors. Light is best thought of as a spectrum consisting of ultraviolet (UV) at the short end, visible light in the center, and infrared (IR) wavelengths at the long end

Ultraviolet (UV) is an [electromagnetic radiation](#) with a [wavelength](#) shorter than that of [visible light](#) but longer than [X-rays](#). UV radiation constitutes about 10% of the total light output of the Sun, and is thus present in [sunlight](#). Ultraviolet rays are invisible to most humans. UV is generally a minor factor in the fading of dyes except when daylight is involved

Visible Light is defined as the wavelengths that are **visible** to most human eyes. •It is measured in lux (lumens per square meter) or foot-candles (fc). One foot-candle is slightly more than 10 lux.

IR Infrared Radiation: radiation produces radiant heat which can damage textiles. It is invisible to humane eyes.

Color temperature is a characteristic of visible light and is stated in units of absolute temperature, known as Kelvin (K). Lower color temperatures (2700 K) are called "warm colors" (yellowish orange). Higher (3000K to 4000 K are whiter.

Kelvin (abbreviation K), less commonly called the degree Kelvin (symbol, ° K), is the Standard International (SI) unit of thermodynamic temperature.

Lumen is a unit of measurement for the brightness of light. Think lumens not watts. For example 40W LED = 450 lumens.

Lux (metric units) is a measure of the amount of light equivalent to 0.0929 foot-candle (English units) and equal to the illumination produced by luminous flux of one lumen falling perpendicularly on a surface one meter square. For example the maximum intensity for sensitive items is 50 Lux.

The **wattage** of a piece of electrical equipment is the amount of electrical power that it produces or uses, expressed in watts.

A **light-emitting diode (LED)** is a semiconductor device that emits visible light when an electric current passes through it. LED have no UV and little heat.

Halogen lamp is a gas-filled, high-intensity incandescent lamp having a tungsten filament and containing a small amount of a halogen, such as iodine.

An **incandescent light** bulb, incandescent lamp or incandescent light globe is an electric light with a wire filament heated to such a high temperature that it glows with visible light (incandescence).

A **fluorescent** lamp or a fluorescent tube is a low pressure mercury-vapor gas-discharge lamp that uses fluorescence to produce visible light.

Line voltage is the standard voltage that's found in outlets and junction boxes, which is 120 volts in Canada and the United States. Table lamps, and most ceiling fixtures, chandeliers, are line voltage. The beam spread is easier to control with low voltage than line voltage.

Low voltage means there's a transmitter, and the electricity is being transformed so the 120 volts is being brought down to 12 volts.

Transformers are devices used in lighting systems to help reduce or "step-down" high voltages to lower voltages. Commonly used in homes with track/monorail or landscape lighting systems, transformers convert the standard residential electric current (120 volts) to a lower voltage (12 volts or 24 volts) required by the lamp or lighting system.

There are two main types of low-voltage transformers: **electronic and magnetic**. The biggest positive benefit of electronic transformers is they tend to be very small and they tend to be less expensive. Magnetic transformers are known

for their reliability. For our purposes I would avoid dimming if possible. Also for our purposes we shall keep the transformer with the bulb.

What are **MR16** lamps? "MR" stands for multifaceted reflector, a pressed glass reflector with the inside (reflecting side) surface composed of facets and covered by a reflective coating. These facets provide optical control by gathering the light from the filament to create a concentrated beam of light.

CRI a color rendering index is a quantitative measure of the ability of a light source to reveal the colors of various objects faithfully in comparison with an ideal or natural light source. For textiles, prefer LEDs with a high color rendering index (CRI), which is a measure of the color accuracy of the light. Some of the better LEDs have a CRI in the low- to mid-90s, which is good enough to see color nuance through the full visible spectrum (especially deep reds, important for textiles and deficient/inaccurate in many light sources). Cheaper general-purpose LEDs are usually around CRI 80, good enough for utility lighting but not for color sensitive applications. FWIW Compact florescents are often in the 70s and almost totally deficient in deep reds.

Fugitive dye. A dye that is unstable, that is, not fast.

IESNA: Illuminating Engineering Society of North America Standards

The Illuminating Engineering Society of North America publishes standards for the lighting industry.

Damage Weighted Transmittance (Tdw-ISO), which many experts now use to more accurately assess the potential effects of various glazing materials on fading. This factor quantifies the ability of glass to reduce fading by measuring the effects of both transmitted UV and visible light.

PAR: Diameter of the face of the lamp expressed in 1/8ths of an inch. Stands for parabolic aluminized reflector.

Suggested Lighting Equipment

WAC LHT-817- WT lighting double droid Model 817 uses two 12V MR16 bulbs (not included). Finish in white, black or aluminum. Comes with electronic transformer built in. Compatible with L, H and J/J2 track systems. I ordered LHT-817- WT. Do not buy LED model as comes with bulbs you do not want. LHT is Lightolier compatible. Dimmable although do not dim for out purposes. Source: Lighting Direct @ \$108 originally \$151.20. Can order from Amazon or most lighting retailers.

Lightolier shallow ring MR16 track light with electronic transformer built in. Order in white. Lists for \$108 but can find for \$58. Poorly constructed and over priced at \$108. Other manufacturers make similar fixtures at \$20 but be careful can use Soraa Snap on lens with and compatible with your track system. Check Amazon and other on-line sources.

Lightolier Basic White Monopoint. 6190WH 4.3 inches round. \$21.50 Amazon

Soraa 00923. MR16 bulbs for use with Snap System. - 7.5 Watt - LED - MR16 - 50 Watt Equal - 6000 Candlepower - 3000 Kelvin - 95 Color Rendering - 10 Deg. Narrow Spot. Amazon \$22.50

Soraa 00335 - Flat Top #116138D - Flat Top Lens Snap System - 25X25 Deg. Beam for Soraa LED MR16 - Self-Centered Magnet \$6.60

Soraa 00337- Flat Top Lens Snap System - 36X36 Deg. Beam for Soraa LED MR16 - Self-Centered Magnet \$6.60

Soraa 00339 - Louv#116134C- Louver Lens Snap System - 40 Deg. Cutoff Beam for Soraa LED MR16 - Self-Centered Magnet \$6.60

VELCRO Brand - Sew On Fasteners - 15' x 2" Tape \$22.20

3M Sun Control Window Film. PR50, PR60 & PR70 UV rejected 99.9%. Plastic film applied to inside of existing glass to screen UV light and decrease heat transmission. Local contractor for Prestige Window Film: Professional Window Tinting, Inc. www.tintglass.info \$25 per window pane, \$270 per French door with two single pieces of glass.

Garvin Electrical Manufacturer Decorative Ceiling Trim Plate for securing 4.3" Lightolier Monopoint to 6" recessed ceiling fixture opening. Plate is 8" Diameter, 3.75" I.D. White, Steel. \$14 per plate plus shipping.

Acknowledgments: James Henderson- manager of materials technology for General Electric. Below articles by James Henderson and served as references for this presentation.

Oriental Rug Review. Volume XI, Number 5. Light Sources and Fading. P.26-29

Hali April 1991 Issue 56 p.137

Hali October 1991 Issue 59 p.80

Lighting Design & Application May 1991. Dye Fading p.16-25

Oriental Carpet and Textile Studies Volume IV 1993 Light Sources and Fading p.273-281

GE Lighting. Light Sources and Dye Fading June 2009 p.1-8.

Links

MWNF Museum With No Frontiers Carpet Collection

1ST Dibs : click on carpets. Fun site for the 1%.

TurkoTek : a noncommercial site devoted to collectible weavings, where rug enthusiasts can connect.

Eccentric Wefts Textiles and Text : John Howe site

R John Howe: Textiles Rug Appreciation Mornings

Rug Kazbah: very opinionated site. Fun to read if you do not take it too seriously

RugRabbit: on line site to show and sell antique oriental rugs. Always ask what is the dealer's return policy.

Brian MacDonald Antique Rugs

Paradise Oriental Rugs: California retail shop with many educational videos.

Nomad Rugs: California on line site for new rugs. Excellent photos and fair prices especially when 20% off sales.

Austria Auction Co.: well regarded auction house.