

THE ROSCO GUIDE TO  
**COLOR FILTERS**



**A**s a producer of color filters for the performing arts, Rosco has focussed on the science of color for nearly 100 years. But stage lighting is an art, not a science. The people who use Rosco filters are artists who manipulate the spectrum to enhance stage pictures, dealing with appearance, reflectance, perception, contrast and psychological impact. This guide was developed with two objectives. First to provide some background in the science to those who utilize color artistically and second, to offer some recommendations for color selection.

Most of the colors in the Rosco range have been created by designers over the years to achieve specific effects and the range is extensive. By additive mixing using multiple sources and by using multiple filters in units, a virtually unlimited palette can be achieved. Apparent color can also be made to appear “cooler” at a higher dimmer setting and “warmer” at a lower intensity, permitting further variation. It is unlikely, however, that the range is complete. Designers will continue to innovate and the artistic needs will evolve. Coincidentally new dye chemistry and plastics technology will permit the development of new Rosco filters not currently possible.

## USING THIS GUIDE

This guide was developed to provide designers with suggestions on how specific Roscolux colors might be used for lighting the stage. We have grouped the colors according to some commonly accepted categories.

**Front Light** is divided among Warm, Cool, and Neutral groups for lighting acting areas. These color distinctions help to establish mood, emotion, time and place. The colors included are generally flattering to skin tones and enhance scenery and costumes.

**Accent Lighting** is also divided between Warm and Cool. These slightly more saturated colors may be used to shape and define an object or person. Typically, accent lighting is focused from side or back positions or, on occasion, as down light.

**Natural Light** on stage usually comes in one of four variants: warm sunlight, cool daylight, moonlight, and cyclorama wash lighting used to create the illusion of a sky/horizon line. This section of the guide makes recommendations for choosing colors appropriate to each of these applications. Here you will find suggestions that render both true, natural lighting and strong, stylized sky lighting. Your design and the needs of the play will determine which is the right choice for you.

**Special Effects** lighting encompasses a broad category. Listed in this section are strong, stylized colors that can be used to create dramatic lighting effects from fire and rain to surreal, ominous atmospheres. Again, the choice of color is purely personal and determined by the needs of the overall design.

Choices are not immutable. As Tharon Musser has said, “If a color doesn’t look right on stage, just change it!”

## Contributors to this guide

### Ken Billington

He has designed the lighting for over 50 Broadway productions and garnered six Tony nominations in the process. The long term Principal Lighting Designer for New York’s Radio City Music Hall, he has worked extensively in television and architectural design.

### Donald Holder

Donald Holder’s brilliant lighting design for the Broadway production of “The Lion King” earned him the triple crown of theatrical awards: The Tony Award, the Drama Desk Award and the Outer Critics Circle Award.

### Brian MacDevitt

Brian MacDevitt has designed lighting on and off Broadway in New York and in major regional theatres around the country. His awards include an Obie, the LA Ovation and Drama Logue, a Bessie and Lucille Lortel Award. He teaches at NYU Tisch School of the Arts and Purchase College.

### Peter Maradudin

He has designed the lighting for over 200 productions for virtually every major regional theatre in the country. He has earned nearly a dozen Drama Critics Circle awards in six different West Coast cities. He is the founding principal of the lighting design company, Light and Truth.

### Richard Pilbrow

Widely regarded as the dean of lighting designers for both the West End and Broadway, he also heads Theatre Projects Consultants. He has authored two much acclaimed books on stage lighting.

### Kevin Rigdon

Kevin Rigdon is now the Associate Director of the Alley Theatre in Houston and Professor of Design at the University of Houston. His Broadway credits include “Grapes of Wrath”, for which he received Tony Award nominations for both scenery and lighting, “Buried Child” and the revivals “A Streetcar Named Desire” and “Our Town”.

### Jennifer Tipton

Jennifer Tipton’s many awards for lighting in dance, theatre and opera include two Tonys, two Bessies, two American Theatre Wing awards, two Obies and two Drama Desk Awards. A veteran teacher at the Yale University School of Drama, she has influenced a generation of lighting designers.

# Designers On Color

Color has been an important component of stage lighting since the days of candles and silk. We reproduce here comments on the subject from the published works of some leading lighting designers:

## Gilbert V. Hemsley, Jr.

"I think one of the greatest joys of lighting design is communicating to an audience how you, as a designer, feel about and understand color. Walking out from a darkened theatre on a sunny Spring afternoon and feeling my response to the R02 of the warm sunshine, the R64 of the blue sky and the R87 light green shadows of the new leaves makes my head spin with the realization that I can translate my color excitement to a production of 'You Can't Take It With You'. I can make an audience see and feel the excitement of a beautiful Spring afternoon when the curtain goes up in a darkened theatre.

It may sound strange, but I carry a color swatchbook around in my head. As I see, feel, and respond to color and color combinations in the real world, I make mental notes of the colors I see and my responses to them. I have a storehouse of emotional and rational responses and the colors that go with them.

In learning to be artists as lighting designers it is exhilarating to have a full personal response to color and color combinations in the real world ... and then communicate them to the real audiences of the theatre world."

## Tharon Musser

"The important thing to remember is that there are no rules in lighting with color. The design has to look right to you – it has to reflect your taste.

My advice about color is this: Don't sweat it! It's the easiest, cheapest thing to change. If a color doesn't look right on stage, just change it."

## Nananne Porcher

"How does one learn what color will do? The obvious answer is, light a lot of shows. But that is hard on the directors and performers you learn on.

So learn by experimenting. Get samples of a wide range of colors in various densities. Set up a couple of spotlights in separate dimmers. Mix and blend and dim your colors ... and look and remember ... and if nature has provided you with a retentive visual memory, you are on your way to understanding color.



You should never stop learning and remembering. Store up in your sight banks every sunset, every dawn, how light reflects off snow, what happens when street lights fall on a new color ... and change that color ... how everything is black and white at a low light level. Make the human eye work for you as a designer. And make your own eyes work for you all the time."

## Richard Pilbrow

"Fractured white light reveals color. Part of the magic of stage lighting is taking complex multi-directional palettes of color and re-combining them into lucid, dramatic light for the stage.

When I began lighting, only about fifty shades of Cinemoid were available. I often used them two or three to a frame seeking new possibilities. Then I discovered the Rosco range and first brought this wonderful range to Britain. Now the possibilities are almost limitless.

Color brings life, texture and vibrancy to the stage. I love it!"

## Jennifer Tipton

"The use of color is key to a lighting designer's craft. I am constantly reminded as I watch the light change from the brilliance of a sunny morning to the early dusk of a winter afternoon, how much color there is in natural so-called 'white light' and how much variety in color can be made by simply brightening and dimming a light. It is a wonderfully juicy thing to 'paint' with colored light – to use light expressionistically – to make the audience feel the scream, live the blues or dance with danger. Or to paint with colored light can simply be about the beauty of juxtaposing one color next to another and being able to change it from one moment to the next for purely compositional reasons. But I am also madly in love with the ravishing light that can be made from the use of the very limited range of colors – lavender, blue and clear – that makes the skin glow no matter what color the skin may be."

## David Belasco

"The greatest part of my success in the theatre I attribute to my feeling for colors, translated into effects of light." (1919)



"Color brings life, texture and vibrancy to the stage", according to Richard Pilbrow. His lighting design for "Show Boat", shown at left above illustrates this idea vividly. The late Gilbert V. Hemsley, Jr. said that "I carry a color swatchbook around in my head". An example of his brilliant application of color is shown in the photo at right.

# UNDERSTANDING THE SPECTRUM AND SED CURVES

Visible light is the small part of the spectrum of electromagnetic radiation between approximately 400 and 700 nanometers. Each wavelength has a “spectral signature”, or color, ranging from violet at 400 through indigo, blue, green, yellow and orange to red at 700. The combination of these colored wavelengths creates white light. Colored light can be described as the presence of certain wavelengths and the absence of others.

A color filter functions by selectively transmitting or blocking (absorbing) spectral elements of a beam of white light emanating from a light source. For example, a Roscolux 27 Medium Red filter will allow red light frequencies to pass through and absorb blue and green. Of the radiant energy which is blocked, by far the largest part is absorbed by the filter as heat. This is why heat stability is a significant consideration in filter design. The heat created by the absorption of energy leads to degradation of the filter.

Lighting designers mix or blend colors through an additive or subtractive process. Blending light beams of different colors on a surface is an additive process. Creating a colored beam by filtering white light is a subtractive process – the desired color is transmitted while the other wavelengths are absorbed (or “subtracted”).

A Spectral Energy Distribution (SED) curve is a graph of the transmission of energy plotted by wavelength. These curves are included in the swatchbooks of Rosco filters. In Fig. 1, the curve for R27 shows that frequencies above 620 nm will pass through the filter at varying percentages, while the wavelengths below will not.

As a reference, the peak intensity for violet is 440, blue 480, green 520, yellow 570 and red, 650.

Most Rosco colors are blends so the curve will have multiple peaks. The graph for R54 Lavender for example, shows a high component of both violet and red.(Fig. 2)

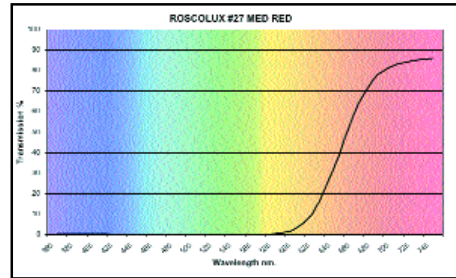


Fig.1

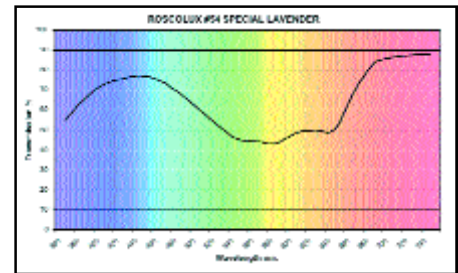


Fig.2

## BALANCING LIGHT OUTPUT

Traditionally, correcting the color temperature of various lamps has been a chore left to architectural lighting designers or cinematographers, but the wide range of light sources used in modern theatrical lighting has changed this. Rosco offers filters for balancing different lamp types.

Lighting a scene with both a 4000°K Metal Halide lamp and also a 3200°K incandescent lamp will result in either the Metal Halide appearing very blue, or the incandescent very red, depending on the overall balance of light on stage. To correct for this, either raise the color temperature of the incandescent to 4000°K using R3204 (1/2 CTB Blue), or lower the Metal Halide to 3200°K with R3409 (1/4

CTO Orange). For more information on color correction filters, see the Rosco publication “Filter Facts” or visit the web site.

It is important to remember that filtration is a subtractive process ... filters can only transmit or block frequencies of light, not add them to a source. This is significant when using lamps that are deficient in particular wavelengths. Although many lamp types seem attractive because they offer the economy of long life, they have a limited spectrum. A typical metal halide source, (Fig. 3) for example, has very little energy in the red end of the spectrum. Note that even the most common theatrical source, the tungsten-halogen or incandescent lamp (Fig. 4) although rich in red/yellow, is deficient in blue/green. These characteristics of sources and filters are most obvious when one becomes familiar with the relevant SED curves.

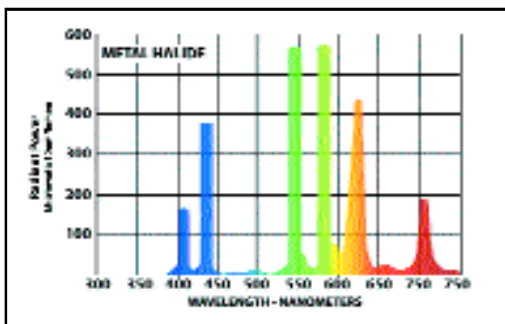


Fig.3

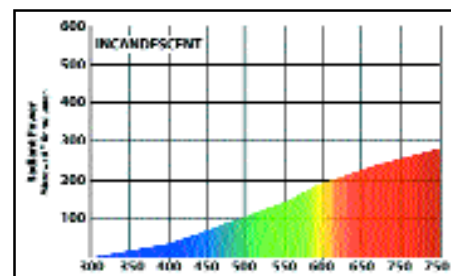


Fig.4

## MANUFACTURING HIGH TEMPERATURE COLOR FILTER

A color filter combines light refracting elements, normally organic dyes, which are suspended in or coated on a transparent base. Rosco began producing gelatin filters in 1910, but since the 1950s, color filters have been fabricated on plastic bases. Polycarbonate, the base used for most of the Roscolux range, is the most durable of the polymers currently utilized.

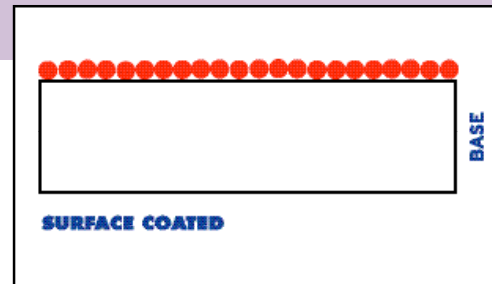
There are three methods currently employed to integrate dyes with polymer bases in order to create color filters. The products are described as:

- **Surface Coated**
- **Deep Dyed**
- **Body Colored**

### Surface Coated Polyester

(Rosco E-Colour, Lee Filter)

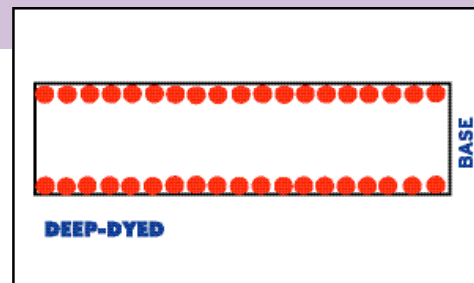
The easiest way to produce a color filter is to simply coat the color on top of a plastic film base. Polyester film (PET) is widely used as a base material for coloring since it is relatively inexpensive and will accept coatings of solvent-based coloring agents. Since no heat is involved in the process, dyes used need not necessarily be heat-resistant. Coated polyester filters begin as a roll of clear film which is then “painted” with a dye solution on one or both sides. To identify the coated surface, apply a simple solvent like nail polish remover and the dye and lacquer carrier will dissolve.



### Deep-Dyed Polyester

(Rosco Cinegel, GAM Filter)

Like surface coated PET, deep dyed film begins with a roll of clear polyester. The film is passed through a bath of heated solvent suffused with dye. The solvent causes the PET film to swell expanding the polymer structure of the film and allowing the dye molecules to penetrate the surface. The film is then washed and the polymer contracts to its normal form, trapping the dye molecules below the surface. Compared to surface coating, more extreme temperatures are required to cause the dye particles to sublimate through the surface. Deep-dyed filters are, therefore, more resistant to fading than surface coated.

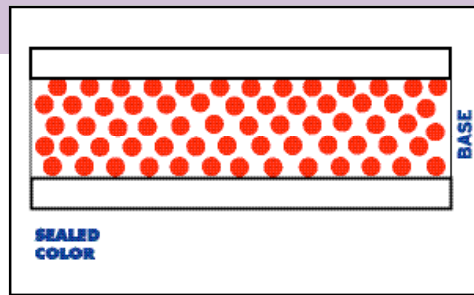


# MANUFACTURING HIGH TEMPERATURE COLOR FILTER

## Body-Colored Polycarbonate

(Roscolux)

In a body-colored color filter, like Roscolux, the colorant is inherent within the plastic substrate. The process starts with powdered resin and dye being fed into an extruder. Under intense pressure and heat approaching 600°F, the drive screw combines the melted resin and dye into a through-colored "honey". This colored mixture is extruded through a die which forms it into the colored core of a film 24" wide.

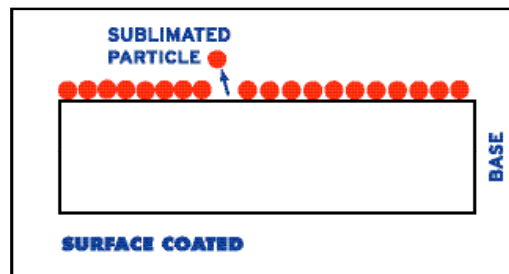


In Rosco's co-extrusion process, a second extruder pumps clear material into the same hanger die. Baffles direct the clear over and under the colored core. The finished film that exits the die is an engineered filter composed of 3 mils of color sealed between two clear protective layers for a total thickness of 4 mils (4 thousandths of an inch).

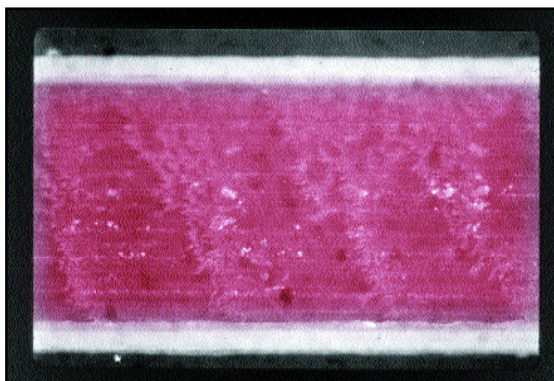
The excellent performance on a light of this engineered filter is a function of both the higher temperature resistance of the base polymer combined with the unique assembly of sealing the color core between clear layers. For the color to fade by sublimating, the dye molecules must migrate out of the body-colored internal layer and then through the clear sealing layer.

One other advantage of Rosco's extrusion process is that the filter is not oriented during manufacturing. Typically, large plastic manufacturing plants will extrude a thicker gauge of plastic than the desired finished thickness. As it is extruded, the thicker film is pulled and stretched down to its final thickness. This stretching orients the plastic, and under the heat of a spotlight, the film will try to shrink back to its original shape. Polyester is an oriented film and these stress distortions are quite apparent on color frames of hot lights and will create significant problems when used in scrollers. Because Roscolux is extruded to its finished gauge without orienting, these problems do not occur.

In any color filter the dye eventually migrates away from the hottest area. The rate at which the filter fades is a function of the stability of the dye employed and the process used to add the dye to the base plastic. Obviously, when simply coated on the surface, a dye will sublimate from the base into the air as a gas more easily than a dye which is sealed into a color core.



Durability is an important consideration to the filter user for several reasons. A filter which lasts longer must be replaced less often and, therefore, is more economical ... more "blue for the buck". Longer lasting filters can also be relied upon to perform longer on lights in inaccessible positions.



*Shown here is a cross section of co-extruded Rosco filter photographed through an electron microscope. Note the discrete clear layers on the top and bottom sealing in the color core.*

Stage lighting is an art, not a science. We show here, as suggestions, some widely used applications for specific Roscolux colors. Your design and the needs of the production should determine the right color choices for you.



*"In A Streetcar Named Desire, Tennessee Williams describes the poker scene as having 'the lurid nocturnal brilliance' of Van Gogh's painting of a billiard-parlor at night. R11 in a soft down light, R09 from high backs, and R365 with templates helped me paint Van Gogh's work in light."*

Kevin Rigdon

# Lighting The Acting Areas

## filters for warm acting areas

ROSCOLUX	APPLICATIONS
01 Light Bastard Amber	Enhances fair skin tones. Suggests strong sunlight.
02 Bastard Amber	Good where a tint of color is needed. Excellent for natural skin tones.
302 Pale Bastard Amber	Very pale warm white. Perfect for enhancing the HPL lamp in a Source Four™.
03 Dark Bastard Amber	Most saturated Bastard Amber.
303 Warm Peach	Strong amber with undertones of pink. Useful for warm sunrise and sunsets.
04 Medium Bastard Amber	Excellent for natural sunlight.
304 Pale Apricot	A peach amber. More yellow than 305.
05 Rose Tint	A clean pale pink; useful as a "blush" for skin tones.
305 Rose Gold	A pale blush amber for skin tones and backlight.
3410 RoscoSun 1/8 CTO	Converts 5500°K to 4900°K.
3409 RoscoSun 1/4 CTO	Converts 5500°K to 4500°K.
3408 RoscoSun 1/2 CTO	Converts 5500°K to 3800°K.
3411 RoscoSun 3/4 CTO	Converts 5500°K to 3200°K. Nice strong amber. Less pink than R04.
3407 Full CTO	Converts 5500° K to 2900° K. Dominant amber.
06 No Color Straw	Slightly off white. Good for interiors.
07 Pale Yellow	Double saturation of 06.
08 Pale Gold	Warmer straw. Flattering to skin tones.
09 Pale Amber Gold	Deep straw. Good for late afternoon sunsets or firelight.
4515 CC 15 Yellow	Very pale yellow. Interior lighting to create industrial mood.
15 Deep Straw	Warm golden amber with some green. Useful for candlelight, firelight.
16 Light Amber	Excellent area light. Light pink-amber tint. Safe for most light skin tones.
316 Gallo Gold	A pale reddish gold, good for creating sunrise or sunset, or simulating incandescent light. A flattering naturalistic backlight color.
17 Light Flame	Heavier pink-amber tint. Useful for dance. Especially useful when balanced with a cool color. Good general warm tint in striplights.
317 Apricot	A rosy amber which produces a romantic sunset color.
318 Mayan Sun	A medium salmon color which evokes feelings of a tropical island. A good sunset color. Good for warm tonal effects.
325 Henna Sky	Toasted red-amber color. Useful in re-creating setting sun or as a dramatic cyc.
4615 CC 15 Red	Very pale red. Subtle warming on skin tones. Warmer than R05.
4630CC 30 Red	Double 4615. Pale red with peach tones. Nice on skin when paired with a cooler cross light.
30 Light Salmon Pink	Excellent for general area washes. Gives overall warming effect to skin tones.
31 Salmon Pink	General wash. Good for follow spots.
331 Shell Pink	Beautiful blush pink. Nice on skin tones.
33 No Color Pink	A pale almost colorless pink.
333 Blush Pink	A pink tint excellent for most skin tones.
34 Flesh Pink	Useful for bright musicals. Creates a happy atmosphere.
35 Light Pink	Similar to 33, but slightly deeper, with less violet.
4815 CC 15 Pink	Excellent on all skin tones. Not as cool as 333.
4830 CC 30 Pink	Double 4815. Pretty pink. Nice for musicals and "happy" lighting.
36 Medium Pink	Good for general washes and cross lighting.
37 Pale Rose Pink	Blue Pink. Use in general washes and toning.
337 True Pink	A cool pink excellent for washes and general illumination. A good follow spot color.
38 Light Rose	Similar uses as 37, but with greater saturation.

## filters for cool acting areas

ROSCOLUX	APPLICATIONS
3216 Eighth Blue (1/8 CTB)	Boosts 3200°K sources to 3300°K.
3208 Quarter Blue (1/4 CTB)	Boosts 3200°K sources to 3500°K.
3206 Third Blue (1/3 CTB)	Boosts 3200°K sources to 3800°K.
3204 Half Blue (1/2 CTB)	Boosts 3200°K sources to 4100°K.
3202 Full Blue (CTB)	Converts 3200°k sources to nominal daylight.
3220 Double Blue	Bright nighttime area lighting. Crisp moonlight.
4215 CC 15 Blue	Very pale blue tint with a hint of red. Nice no-color definition when crossed with 51.
4230 CC 30 Blue	Double 4215. Pale blue with a reddish cast.
4260 CC 60 Blue	Double 4230. Medium blue with red tones. Nice cool crosslight on most skin tones.
60 No Color Blue	Helps maintain white light when dimmer is at low intensity.
360 Clearwater	The slightest blue tint. Excellent for eliminating amber shift when lights are running low on a dimmer. Good for cool area light.
61 Mist Blue (greener)	Excellent for general area washes. Very light cool tint of blue.
361 Hemsley Blue	A sharp, cold blue that stays clean when dimmed.
62 Booster Blue	Helps maintain white light when dimmer is at low intensity.
362 Tipton Blue	A soft clean blue. Good choice for cool area lighting. Can also be used to shift the amber of lamps running at low dimmer levels.
63 Pale Blue (greener)	Good for creating an overcast look and feeling.
363 Aquamarine	A pale blue-green color. Can be used for area lighting. A soft backlight color.
64 Light Steel Blue	Useful for beams of realistic moonlight.
364 Blue Bell	A clean light red blue. Creates naturalistic daylight fill color.
65 Daylight Blue	Useful for achieving depressed moods and dull skies.
365 Tharon Delft Blue	Clean blue with more red than 364. A true color correction filter for film. Converts 3200° Kelvin to 5500° Kelvin. Good for area light.
66 Cool Blue	A pale green shade of blue; good for area or general washes. Creates an icy feeling on stage.
67 Light Sky Blue	Excellent sky color. Useful for cyc and border lights.
368 Winkler Blue	A silvery blue, used for front light and moonlight.
70 Nile Blue	Useful for very light midday skies.
71 Sea Blue	Occasionally used for general cool tint and non-realistic washes.
72 Azure Blue	A clean slightly green blue. Good moonlight fill.
371 Theatre Booster 1	Full blue for cooling incandescent lights to daylight. Clean with no red.
372 Theatre Booster 2	Half blue for cooling incandescent lights to daylight. Clean with no red.
373 Theatre Booster 3	Quarter blue for cooling incandescent lights. Cool crisp "white light".
376 Bermuda Blue	A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.

"I lit *Eventide*, a beautiful, gentle dance about relationships, with R333 and R55. The idea was to envelop the dancers in a warm intimate light that seems personal and private. Each dancer's skin, no matter what color it is, seems to radiate its own light in this atmosphere."

Jennifer Tipton



## filters for neutral acting areas



"In the play *True West*, I needed to show a surreal heat. I kept trying to get heat with increased intensity, but it didn't work. The brighter I made it, the colder it looked. What finally worked was a light curtain using strip lights on moving yokes colored with a scary, acidic yellow— R15, Deep Straw. The lights were preset to come up hitting the audience in the face and then raking down to wash the stage for the remainder of the scene. This is an intense Roscolux color, leaning a bit toward the green. Its not pleasant. It gave me just the effect I needed."

Brian MacDevitt

### ROSCOLUX

### APPLICATIONS

3318 1/8 Minus Green	Very light magenta correction. Removes slight green cast in HPL lamps.
3314 1/4 Minus Green	Pale magenta correction. Nice tone on skin without adding color.
3313 1/2 Minus Green	Light magenta brightens blues and pinks. Warmer than lavender.
3308 Tough Minus Green	Nice pale lavender. Use a cool crosslight when paired with pink or amber. Or as a warm crosslight when paired with a blue or violet crosslight.
4715 CC 15 Magenta	Pale magenta. Cooler than 3318. Useful on many skin tones.
4730 CC 30 Magenta	Double 4715. Medium cool magenta. Nice fill light without adding warmth.
51 Surprise Pink	Touch of color when white light is not desirable.
351 Lavender Mist	Pale, no-color lavender. Nice cool white light.
52 Light Lavender	Excellent for general area or border light washes. It is a basic followspot color.
353 Lilly Lavender	Nice cool lavender. Slightly warmer than R55.
53 Pale Lavender	Use when a touch of color is needed.
54 Special Lavender	Same as 53, but warmer.
4915 CC 15 Lavender	Pale no color lavender. Slightly cooler than 351. Tones without adding color.
4930 CC 30 Lavender	Double 4915. Excellent cool on skin tones. Nice warm tones during nighttime.
4960 CC60 Lavender	Double 4930. Rich comfortable lavender. Compliments darker skin tones.
55 Lilac (bluer)	Same as 53, but cooler.
355 Pale Violet	A cool lavender which acts as a neutral in a three color area lighting system. Will work well as a wash for drops or set pieces. Tones the space. Effective as moonlight shadows.
56 Gypsy Lavender	Highly saturated, good for side and backlighting and non-realistic effect.
356 Middle Lavender	A lavender halfway between 52 and 57 in hue and value. Useful for general illumination and side-lighting.
57 Lavender	Gives good visibility without destroying night illusions.
357 Royal Lavender	A rich lavender which will enhance blue and red costumes and scenic pieces.
58 Deep Lavender	Excellent back light. Enhances dimensionality.
359 Medium Violet	A lavender with a strong blue component, ideal for backlighting.
377 Iris Purple	Deep blue with red accents. Dark nighttime atmosphere.
99 Chocolate	Warms light and reduces intensity.

# Using Sidelights, Downlights And Backlights For Accents

## filters for warm accents

ROSCOLUX	APPLICATIONS
4590 CC 90 Yellow	4530 + 4560. Saturated pure yellow. Enhances greens in sets and costumes.
10 Medium Yellow	Clean bright yellow. Good for special effects and accents. Unflattering in acting areas.
310 Daffodil	A soft medium yellow. Can be used for creating naturalistic effects such as early morning sunlight or for special effects.
11 Light Straw	Warm pale yellow. Useful for fire effects. Can be used for area lighting. For bright day feeling.
12 Straw	Good for special effects and accents. Use with caution on skin tones.
312 Canary	Warmer than 10. A bright, vibrant yellow that evokes "exotic" sunlight. Use with caution on skin.
313 Light Relief Yellow	Vibrant warm yellow. More red than 312 without the green cast.
14 Medium Straw	Pale amber, useful for sunlight and firelight accents.
15 Deep Straw	Warm golden amber. Useful for special effects-candlelight, sunlight and firelight. Tends to depress color pigment values.
316 Gallo Gold	A pale reddish gold, good for creating sunrise or sunset, or simulating incandescent light. A flattering naturalistic backlight color.
18 Flame	Pinkish amber. Creates afternoon sunset or sunrise.
318 Mayan Sun	A medium salmon color which evokes feelings of a tropical island. A good sunset color. Good for warm tonal effects.
20 Medium Amber	Afternoon sunlight, evokes feelings of autumn, lamplight and candlelight.
21 Golden Amber	Useful as amber cyc light, late sunsets, and firelight.
321 Soft Golden Amber	Good for autumn color. A good sunlight transition color that shows the progression from the sun from white or yellow to amber later in the day.
2002 VS Orange	Flattering firelight.
23 Orange	Provides a romantic sunlight through windows for evening effects.
4660 CC 60 Red	Medium red with pale salmon accents. Romantic subtle back or side lighting.
4690 CC 90 Red	Strong salmon red. Deeper and more orange than 32. Beautiful backlight.
331 Shell Pink	Beautiful blush pink. Nice on skin tones.
32 Medium Salmon Pink	Deepest of the salmon pinks.
332 Cherry Rose	A tropical pink that is good for musicals or concert lighting. A good back light color. Interesting accent color. Good for a splash of sunset color.
4830 CC 30 Pink	Medium pink makes a nice side light accent. Adds a splash of pink without being too obvious.
4860 CC 60 Pink	Rich pink accent. Excellent in follow-spots.
4890 CC 90 Pink	Deep rich pink. Lighter than 332. Romantic backlight or accent color.
4760 CC 60 Magenta	Strong pink/magenta. Interesting side light with slight bluish cast.
39 Skelton Exotic Sangria	A sultry, deep purple. Good for musicals or concert lighting. Excellent special effects color.
339 Broadway Pink	A deep, saturated pink created for musicals and "specials". Excellent for down and backlighting.
40 Light Salmon	Similar uses to 23 but a bluer color.
44 Middle Rose	Musical pink. Lush accents. Very versatile color.
344 Follies Pink	A vibrant, almost fluorescent pink with a cool component. Traditionally important as a special effects color in the Broadway musical. Follow spot and dance applications as a modeling color.
47 Light Rose Purple	Good for eerie or dramatic effects. Beautiful backlight color.
347 Belladonna Rose	Saturated deep magenta with hint of purple. Good effects filter for dance.
48 Rose Purple	Pale evening color. Excellent for backlight.
348 Purple Jazz	A dusky purple. Good for simulating purple neon or old night club atmosphere.
49 Medium Purple	Darkest of the magenta purple range.
349 Fisher Fuchsia	A medium fuchsia good for special effects.
50 Mauve	Subdued sunset effect. Useful in backlights. To create seedy atmosphere.
358 Rose Indigo	A warm, red purple good for accents, specials, and backlight.
96 Lime	To simulate "unnatural" sunlight before and after a rainstorm or tornados.



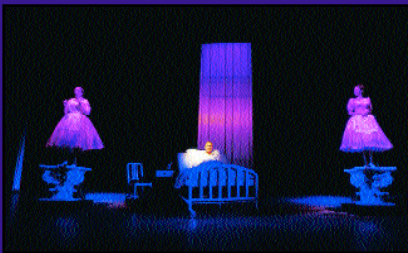
"In this production of *Richard III*, the court of King Edward stands above Richard, backlit from below with R11 Light Straw. The court is silhouetted against a fiery, bloody sky, created using a mixture of R21 Golden Amber and R24 Scarlet."

Donald Holder

## filters for cool accents

"In this dream scene from the Broadway production of *Ride Down Mount Morgan*, a man is being seduced by his two wives. At the beginning, I lit it like a sexy confection with Barbie pink R49 Medium Purple and magenta - actually R59 Indigo. Then the scene goes haywire and the dream becomes a nightmare. As this happens, the stage turns white with a deep red undertone. The white is the shocking horror and the visceral deep blood red, created with R27 Medium Red, is him seeing his own blood. Throughout the play, the colored light played a vital role in transporting the audience to different times and locations."

Brian MacDevitt



ROSCOLUX	APPLICATIONS
3308 Tough Minus Green	Cool pale lavender for beautiful, subtle backlighting.
4930 CC Lavender	Double 4915. Clean medium lavender. Soft accent lighting.
4990 CC 90 Lavender	4960 + 4930. Dynamic, lush backlight. More red than 357.
4260 CC 60 Blue	Double 4230. Good for accents and backlighting, especially dance. Slightly red.
367 Slate Blue	Clean medium blue. Good for sky color or moonlight.
68 Sky Blue	Excellent for early morning sky tones. Popular among designers for cyc and borders.
69 Brilliant Blue	Used for dramatic moonlight effects.
73 Peacock Blue	Good for fantasy, moonlight and water effects.
74 Night Blue	Popular as a backlight or sidelight in contrast to area light.
76 Light Green Blue	Distinctive greenish blues.
376 Bermuda Blue	A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.
77 Green Blue	Useful for romantic moonlight.
2007 VS Blue	Rich deep indigo blue. Slightly more red than 81.
80 Primary Blue	Primary blue. For use with three color light primary system in cyc lighting.
81 Urban Blue	Very cold brittle feeling.
82 Surprise Blue	Deep rich blue with slight amount of red.
382 Congo Blue	The most saturated blue. Good for dark night skies or for a backlight color. A great color for rock and roll concert lighting.
84 Zephyr Blue	Lovely contrast to pale blues; adds coldness to shadows.
85 Deep Blue	Deeply saturated blue with a hint of red.
385 Royal Blue	A very saturated blue. Pronounced red content that will shift toward purple when dimmed. Low transmission but striking contrast when used as a background with lighter accents.
86 Pea Green	Good for dense foliage and woodland effects.
89 Moss Green	Useful for mood, mystery and toning.
389 Chroma Green	Suggests reflected light from dense foliage. A brilliant cyc lighting color which will work for chroma-keying effects in television production.
395 Teal Green	A medium green-blue which can be used as a mystical special effect color. Also an interesting side or backlight color in concert lighting.

# Simulating Natural Light

## filters to re-create sunlight

ROSCOLUX	APPLICATIONS
01 Light Bastard Amber	Enhances fair skin tones. Suggests strong sunlight.
303 Warm Peach	Strong amber with undertones of pink. Useful for warm sunrise and sunsets.
04 Medium Bastard Amber	Especially useful when cross lit with a cool color. Excellent for natural sunlight.
3411 3/4 CTO	Rich amber. Good for strong morning sunlight.
4530 CC 30 Yellow	Double 4515. Medium yellow with green tone. Bright sunlight accents. Not flattering on skin. Combine with 4430 for rich foliage washes.
4560 CC 60 Yellow	Double 4530. Strong yellow with green tone. Deep sunlight rays.
09 Pale Amber Gold	Deep straw. Good for late afternoon sunsets.
10 Medium Yellow	Yellow with green. Good for special effects. Unflattering in acting areas.
310 Daffodil	A soft medium yellow. Can be used for creating naturalistic effects such as early morning sunlight or for special effects.
11 Light Straw	Pale yellow with slight red content. Useful for candle effects. Can be used for area lighting. For bright day feeling.
12 Straw	Greener yellow than 10. Special effects and accents. Use with caution on skin tones.
2003 VS Yellow	Deep yellow with amber tones. Strong, late day sunlight. Flattering on skin.
13 Straw Tint	Much less green than in other straws. Suggests warm sunlight glow when contrasted with ambers and blues.
313 Light Relief Yellow	Vibrant warm yellow. More red than 312 without the green cast.
14 Medium Straw	Pale amber, higher red content than 12. Sunlight, accents, area lighting with caution to skin tones.
316 Gallo Gold	A pale reddish gold, good for creating sunrise or sunset, or simulating incandescent light. A flattering naturalistic backlight color. Can be used for warm area lighting.
317 Apricot	A rosy amber. Produces romantic sunlight effects. Useful as sidelight or back light color.
18 Flame	Warm pinkish amber. Afternoon sunset. Good sidelight.
318 Mayan Sun	A medium salmon color which evokes feelings of a tropical island. A good sunset color. Good for warm tonal effects.
20 Medium Amber	Afternoon sunlight. Lamplight and candlelight. Tends to depress color pigment values.
21 Golden Amber	Useful for amber cyc light and late sunsets.
321 Soft Golden Amber	An amber with some green content. A good sunlight transition color that shows the progression of the sun from white or yellow to amber later in the day.
2002 VS Orange	Rich amber with pink tones. Afternoon sunlight into sunset.
23 Orange	Provides a romantic sunlight through windows for evening effects.
25 Orange Red	Good for firelight or special effects.
325 Henna Sky	Toasted red-amber color. Useful in re-creating setting sun or as a dramatic cyc.
4630 CC 30 Red	Double 4615. Warm sunlight at dusk.
331 Shell Pink	Beautiful blush pink. Nice on skin tones.
332 Cherry Rose	A tropical pink that is good for musicals or concert lighting. A good backlight color. Interesting accent color. Good for a splash of sunset color.
337 True Pink	A component of early morning sunrise.
96 Lime	To simulate "unnatural" sunlight before and after a rainstorm or tornado.



"Here's a hot morning on Catfish Row. I wanted the lighting to almost make you see the sweat! I used R23 and clear on the cyc; it mixed well with the colors used in painting the drop. The backlight is R17, used here on 5K fresnels, for directional color on a large wash. Area lights were R60."

Ken Billington

## filters to re-create skylight

"It's evening on Catfish Row and I wanted a clear, clean light, but one that said 'night' and illuminated the gamblers. I used R83 to make the people and the scenery pop. It mixes well with the other colors I used, including R33 (at 75%) for that warm, sunset glow and R60 in the area lights on the faces."

Ken Billington



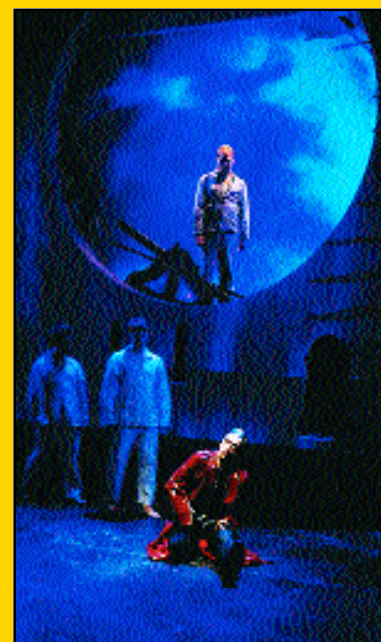
ROSCOLUX	APPLICATIONS
4730 CC 30 Magenta	Double 4715. Medium pink. Adds color to sunset skies.
4960 CC 60 Magenta	Double 4960. Excellent for use in nighttime settings. Mystical moonlight.
57 Lavender	Excellent backlight. Gives good visibility without destroying night illusions.
58 Deep Lavender	Enhances dimensionality.
3220 Double Blue	Bright nighttime area light. Crisp moonlight.
4230 CC 30 Blue	Double 4215. Interesting industrial sky. Overcast, slightly grey daylight.
64 Light Steel Blue	Useful for beams of realistic moonlight.
65 Daylight Blue	Useful for achieving depressed mood and dull skies.
365 Tharon Delft Blue	Clean blue with more red than 364. A true color correction filter for film. Converts 3200° Kelvin to 5500° Kelvin. Good for area light.
366 Jordan Blue	A crisp light blue with hint of green. Flattering on skin tones.
67 Light Sky Blue	Excellent sky color. Useful for cyc and border.
68 Sky Blue	Excellent for early morning sky tones. Popular among designers for cyc and borders.
69 Brilliant Blue	Used for dramatic moonlight effects.
70 Nile Blue	Used for very light midday skies. Occasionally used for general cool tint.
370 Italian Blue	Good to create eerie and mysterious effects. Good for nighttime water effects.
71 Sea Blue	Occasionally used for cool tints and non-realistic area lighting.
72 Azure Blue	A clean slightly green blue. Good moonlight fill.
4315 CC 15 Cyan	Very pale blue green. Interesting industrial daytime skies. Use with caution on skin tones.
4330 CC 30 Cyan	Double 4315. Slightly greener than "normal" daylight. Uncomfortable skylight.
4360 CC 60 Cyan	Double 4330. Strong eerie daylight. Simulates fluorescent and industrial light sources.
73 Peacock Blue	Good for fantasy, moonlight and water effects.
74 Night Blue	Fantasy moonlight. Crisp and beautiful.
376 Bermuda Blue	A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.
78 Trudy Blue	A rich clean red blue that warms to lavender when dimmed.
378 Alice Blue	Moody, cloudy blue with lavender undertones. Urban night skies and ominous, mystical moonlight.
81 Urban Blue	Very cold brittle feeling.
82 Surprise Blue	Deep rich blue with slight amount of red.
383 Sapphire	A deep romantic blue on the red side.
84 Zephyr Blue	A true blue with excellent punch or bright skies.
385 Royal Blue	Excellent for non-realistic backgrounds.

## filters for the cyc/sky

ROSCOLUX	APPLICATIONS
21 Golden Amber	Useful as amber cyc light and late sunsets.
22 Deep Amber	Very useful as a backlight. Dramatic specials and firelight.
26 Light Red	Vibrant red. Good alternative primary.
27 Medium Red	Good red primary for use with three-color light primary systems in cyclorama lighting, footlights, border lights.
359 Medium Violet	Midnight and moonlight illusions. Enforces mysterious mood. Useful for evening cyc wash.
357 Royal Lavender	Excellent for nighttime scenes. Rich, vivid accents, good in backgrounds.
2008 VS Indigo	Cold blue cyc color with strong lavender cast. Eerie moonlight cycs.
4290 CC 90 Blue	4260 + 4230. Deep red blue. Enhances deep blues in costumes and scenery. Vibrant backlight.
64 Light Steel Blue	Useful for beams of realistic moonlight.
65 Daylight Blue	Useful for achieving depressed moods and dull skies.
67 Light Sky Blue	Excellent sky color. Useful for cyc and border.
367 Slate Blue	Clean medium blue. Good of sky color or moonlight.
68 Sky Blue	Excellent for early morning sky tones. Popular among designers for cyc and borders.
69 Brilliant Blue	Used for dramatic moonlight effects.
369 Tahitian Blue	Medium bright blue with some green. Nice water effects color.
73 Peacock Blue	Good for fantasy, moonlight and water effects.
374 Sea Green	Teal blue green. Great for enhancing water scenes or deep sea environments. Greener than R73.
75 Twilight Blue	Rich blue with slight green accent. Dramatic, mystical nighttimes.
375 Cerulean Blue	A crisp, clean blue-green. Useful as a water effect or as a sidelight for dance
76 Light Green Blue	Distinctive greenish blues. Useful for romantic moonlight.
376 Bermuda Blue	A soothing green blue. More blue than 76. A good conventional moonlight color. Interesting tonal color.
77 Green Blue	Deep rich blue moonlight. Won't shift red when taken down on dimmer. Nice for color mixing.
2007 VS Blue	Deep blue, fantasy moonlight or cyc color.
80 Primary Blue	Primary blue. For use with three color light primary system in cyc lighting.
81 Urban Blue	Very cold, hard, brittle feeling.
382 Congo Blue	Deep blue more saturated than 385. Good for dark night skies or for a backlight color. A great color for rock and roll concert lighting.
385 Royal Blue	Excellent for non-realistic backgrounds.

“Later in the play, the ghosts of Richard’s many victims return to haunt him in his dreams. The internal world of his subconscious was evoked by uplighting the set walls and back lighting the space using a very rich blue: Roscolux 83.”

Donald Holder



# Filters For Special Effects



"In Robert Woodruff's production of *The Changeling* (Theatre For A New Audience, 1997) we created a surreal, expressionistic environment using relatively few extremely powerful sources, and at times very intense color. This photograph shows a moment in the King's chambers, lit exclusively with Roscolux 15."

Donald Holder

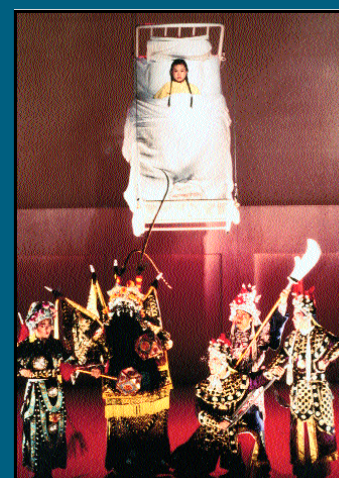
ROSCOLUX	APPLICATIONS
10 Medium Yellow	Yellow with green. Good for special effects. Unflattering in acting areas.
11 Light Straw	Pale yellow with slight red content. Useful for candle effects. Can be used for area lighting. For bright day feeling.
2003 VS Yellow	Rich saturated yellow/amber. Good for sculpting and defining shapes.
13 Straw Tint	Suggests warm glow of candlelight, sunset or interior lighting.
19 Fire	Strong red amber. Excellent for fire effects.
21 Golden Amber	Useful as amber cyc light and late sunsets.
22 Deep Amber	Very useful as a backlight. Dramatic specials.
324 Gypsy Red	Pretty soft red. Flattering effects red.
25 Orange Red	Use when red with higher yellow content is needed.
26 Light Red	Vibrant, red. Good alternate primary.
27 Medium Red	Cycs. Good red primary for use with three-color light primary systems in cyclorama lighting, footlights and border lights.
4790 CC 90 Magenta	4760 + 4730. Clean dominant magenta. Good choice for CYM color mixing.
39 Skelton Exotic Sangria	A sultry, deep purple. Good for musicals or concert lighting. Excellent special effects color.
339 Broadway Pink	A deep, saturated pink created for musicals and "specials". Excellent for down and backlighting.
41 Salmon	Light orange with high blue content.
342 Rose Pink	Extremely intense, hot pink. Produces strong washes of color for concert and dance. Combined with a complimentary color like turquoise, will create a dynamic, sculptured effect.
43 Deep Pink	Rich, hot pink. "Electric" in effect with rich saturation.
343 Neon Pink	A bright, dark pink excellent for musicals or rock and roll concert lighting. A good color for creating fake effects with fluorescent tubes.
344 Follies Pink	A vibrant, almost fluorescent pink with a cool component. Traditionally important as a special effects color in Broadway musicals. Used in follow spot and dance applications as a modeling color.
45 Rose	Use on scenery and background effects. Adds tone and modeling to scenery.
46 Magenta	Similar uses as 45 where more saturation is needed.
346 Tropical Magenta	Deep saturated magenta. Good for concert lighting and wherever strong color is desired.
347 Belladonna Rose	Saturated deep magenta with hint of purple. Good effects filter for dance.
48 Rose Purple	Pale evening color. Excellent for backlight.
348 Purple Jazz	A dusky purple. Good for simulating purple neon or old night club atmosphere.
49 Medium Purple	Darkest of magenta purple range.
349 Fisher Fuchsia	A medium fuchsia good for special effects. An interesting backlight or accent color.
4990 CC 90 Lavender	4960 + 4930. Dynamic. lush accents. Creates rich deep color effects.
358 Rose Indigo	A warm, red purple that recalls the "Jazz Age". Useful for creating saturated color effects in live performance situations-club and musical group lighting.
2009 VS Violet	Deep reddish purple. Nice as a saturated special accent.
2008 VS Indigo	Deep icy blue with violet undertones. Moonlight illusions.
59 Indigo	The original Congo Blue. A purple-blue, highly saturated, for modeling effects and non-realistic atmospheres.
359 Medium Violet	Good for midnight and moonlight illusions. Useful for evening cyc wash.
370 Italian Blue	Good to create eerie, mysterious effects.
4330 CC 30 Cyan	Double 4315. Excellent as light reflected off water. Slight green is useful for neutralizing red in blue tones.

## filters for special effects (continued)

ROSCOLUX	APPLICATIONS
4360 CC 60 Cyan	Double 4330. Greenish daylight. Good for simulating the glow of television screens.
4390 CC 90 Cyan	4360 + 4330. Strong cyan. Fantasy water scenes.
374 Sea Green	Teal blue green. Great for enhancing water scenes or deep sea environments. Greener than R73.
375 Cerulean Blue	A crisp, clean blue-green. Useful as a water effect or as a sidelight for dance.
76 Light Green Blue	Distinctive greenish blue. Useful for romantic moonlight.
77 Green Blue	Rich blue, good for creating "fictional" night time lighting, film-noir moonlight.
79 Bright Blue	Cool clear bright blue.
80 Primary Blue	Primary blue. For use with three color light primary system in cyc lighting.
83 Medium Blue	Good for non-realistic night skies.
384 Midnight Blue	Clean intense red-blue. Deeper than R83 with a little more red.
86 Pea Green	Good for dense foliage and woodland effects.
386 Leaf Green	Bright, clean green. Less yellow than 86. Rich foliage and woodlands.
87 Pale Yellow Green	Sunny spring mornings.
4430 CC 30 Green	Double 4415. Golden green wash. Less saturated but strong, balanced green. Excellent for exterior landscaping.
4490 CC 90 Green	4460 + 4430. Bright saturated clean green.
3317 1/8 Plus Green	Very pale green correction. Neutralizes magenta.
3316 1/4 Plus Green	Pale green correction. Helps incandescent sources simulate the green cast of fluorescent lamps.
3315 1/2 Plus Green	Pale green correction. Unnatural sunlight. Bright and uncomfortable. Use caution on colorful scenery.
3304 Tough Plus Green	Correction to balance daylight sources with fluorescents. Sickly on skin tones.
88 Light Green (darker)	Light yellow green. Nice combined with 87 for leaf breakups.
388 Gaslight Green	A yellow-green similar to the color emitted by gas lighting fixtures. Appropriate for period pieces: i.e. La Boheme, and useful for creating reflections from fields and meadows.
89 Moss Green	Useful for mood, mystery and toning.
389 Chroma Green	Suggests reflected light from dense foliage. A brilliant cyc lighting color which will work for chroma-keying effects in television production.
2004 VS Green	Strong dominant green. Less yellow than 90. "Christmas tree" green.
90 Dark Yellow Green	Alternate primary where higher transmission is desired.
91 Primary Green	Primary green for three color primary system.
92 Turquoise	Useful for creating a mood of mystery and for toning scenery that has been spattered in blues.
392 Pacific Green	Nice medium blue green. Pretty aquamarine on HMI and discharge sources.
93 Blue Green (darker)	Cyan with stronger green tones, lighter than 95. Beautiful when contrasted with lavenders and purples. Good fantasy lighting.
393 Emerald Green	Perfect rich green without yellow or blue undertones. Flattering and pretty.
94 Kelly Green	Fantasy and unrealistic effects. Unflattering on skin tones.
95 Medium Blue Green	Used on foliage in moonlight areas or for creating a mood of mystery. Good for toning scenery painted in blues, blue-greens and greens.
395 Teal Green	A medium green-blue which can be used as a mystical special effect color.
97 Light Grey	Neutral greys to reduce intensity without affecting color temperature.
397 Pale Grey	A halfstop neutral density.
98 Medium Grey	Helpful in balancing brightness of lamps of different wattage.
398 Neutral Grey	40% transmission neutral grey filter. Cuts intensity of light without dimming so colors stay clean.
99 Chocolate	Warms light and reduces intensity.

"In this scene from *The Woman Warrior*, a young girl imagines that she single-handedly defeats the evil warlord and his henchmen. I used a very theatrical R27 Medium Red, cut through with white shins and head-highs and footlights. This color formula helped convey the idea of dream or fantasy sequence."

Peter Maradudin



# Permacolor Dichroics And How They Work

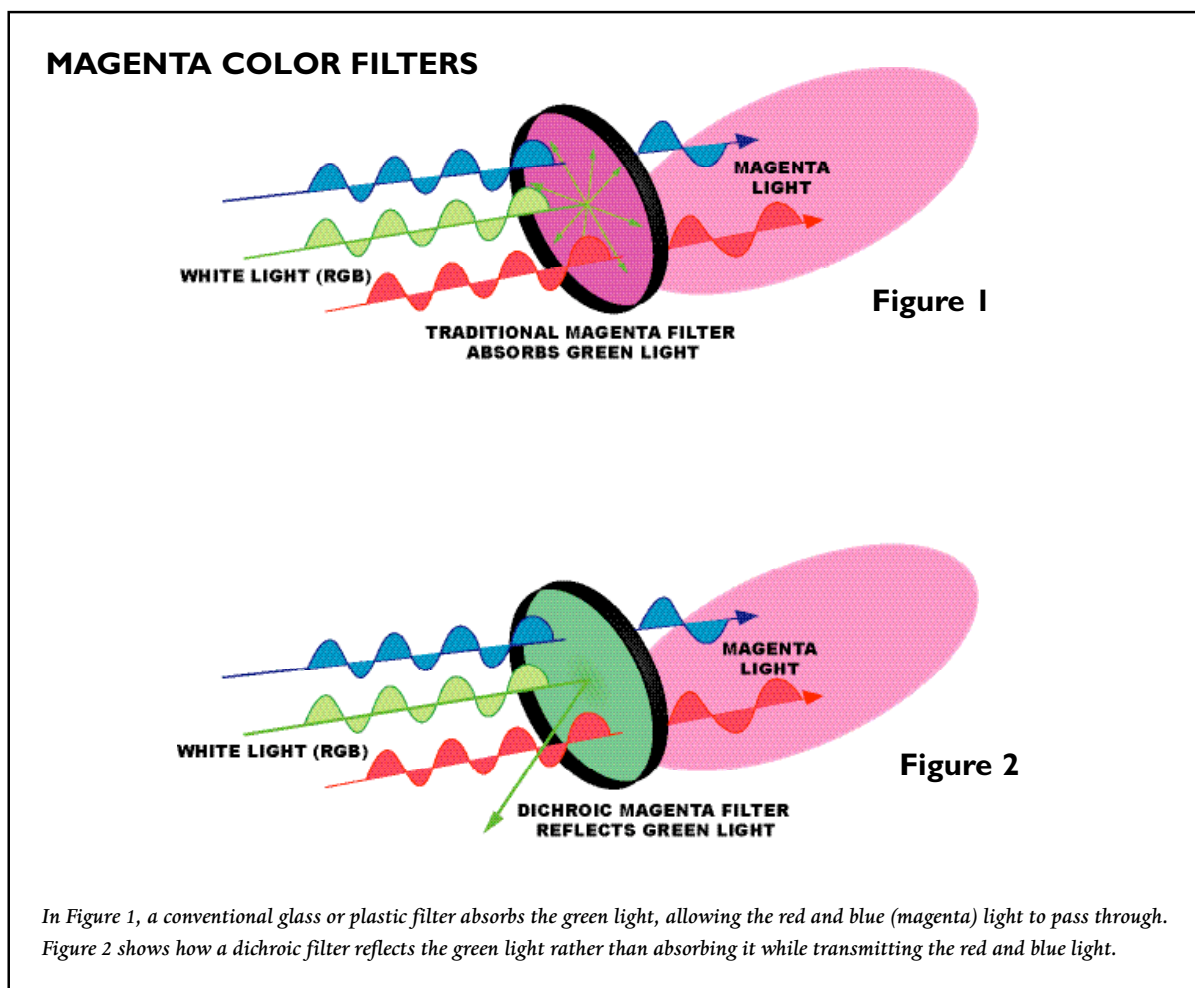
In a conventional color filter, white light is passed through the medium, which absorbs certain wavelengths of light, filtering them out of the composite white light. The rest of the spectrum passes through the filter, thus creating the desired color.

A dichroic color filter works differently. Instead of absorbing the unwanted portions of the spectrum, dichroic filters *reflect* them, acting as a very specialized mirror, but still passing the appropriate colored light.

The technology behind dichroic filters was developed well over a hundred years ago. Using vacuum deposition, thin layers of transparent dielectric materials (typically titanium dioxide and silicon dioxide) are deposited onto a low expansion glass substrate (typically borosilicate). As light crosses the boundary from one layer of one of these materials to another, a little bit of light is reflected. Dichroic filters are made of many layers – a green filter can have more than 50 – so there is a lot of light reflected back and forth between the boundaries of the layers, which sets up patterns of constructive and destructive interference. That is, if light of a particular wavelength is reflected back over itself so that the peaks of the waves line up with the troughs, the waves cancel each other. On the other hand, if the peaks line up with the peaks, the waves reinforce each other. By carefully designing combinations of different thicknesses of layers and thus manipulating the path lengths that the internally

reflected light must travel, it is possible to create a filter that lets certain portions of the spectrum pass through and that reflects other parts of the spectrum.

The effect of a dichroic filter is highly dependent on the angle at which the light strikes the filter. One result of this multi-layer filtering method is that the filtering action is dependent on the length of the path the light takes through the filter. If the light strikes the filter straight on, which is the way most dichroic filters are designed to be used, the light that passes through is the intended color. However, if the light strikes the filter at an angle, the path length is changed, and the color of the light transmitted is different. Light passing through the filter greater than  $20^\circ$  off normal incidence will be shifted away from the desired color noticeably. This produces a colored fringe or halo at the edge of the beam when used on lights with a beam spread greater than  $40^\circ$ . The wider the spread, the more obvious this color shift. While not possible in all instruments, the solution is to filter the light while the rays are essentially parallel, before they pass through any type of spread lens. In the case of an ellipsoidal reflection spotlight, this can be accomplished by placing the filter in the gate of the instrument. In a PAR with interchangeable lenses, the filter should be located inside of the spread lens. Instruments using reflectors to create a wide spread are not appropriate for use with dichroic filters unless a rainbow effect is desired.



# Permacolor Dichroics And Roscolux

Dichroic filters offer several benefits over plastic filters. Most obviously, a dichroic filter can withstand continuous exposure to high temperature lighting instruments without fading or degrading. Borosilicate glass is rated for peak temperatures as high as 450° C. The coating itself can withstand continuous temperatures as high 225° C.

An additional benefit of filters that use selective reflection of specific wavelengths of light is very pure and saturated colors. A dichroic filter in a deep saturated blue may transmit as much as 40% more blue light than an absorptive filter of a comparable color. This increased output may mean fewer luminaires are required in certain situations.

Dichroic filters offer lighting designers an excellent solution to many design problems. They offer higher color transmission, can withstand extremely high temperatures and can preserve the integrity of a design over a long run with little maintenance. However, they require more planning during the specification process. Using the resources of both the luminaire manufacturer and the filter suppliers, these minor hurdles can be overcome and the full benefits of this filter technology can be realized.

## USING DICHROIC FILTERS

Given these unique characteristics, the specification and installation of dichroic filters requires some special care and attention.

- Insure that the lighting instrument in question does not have a beam spread wider than 40° or color fringing may result.
- Determine whether the maximum temperature of the lighting instrument exceeds the rating on the coating or the glass. Does the instrument create hot spots? Borosilicate glass has excellent thermal properties, but is rated for maximum hot spotting of 90° C / sq. cm.
- How will the filter install in the luminaire? While traditional theatrical instruments have built-in accommodations for color filters, many architectural lights do not. If the luminaire has a wide beam spread, can the filter be installed before the spread lens to avoid fringing? Is there a layer of safety glass installed by the luminaire manufacturer? Dichroic filters should never be used to replace the safety glass.
- Install the filter with the coated side towards the lamp. Since dichroic coatings reflect unwanted wavelengths, the only energy that actually passes through the glass is the desired portion of the spectrum. Therefore very little energy is absorbed as heat. However, if the filter is installed with the coated side away from the lamp, the entire light output of the lamp must pass through the glass before the unwanted energy is reflected back. The glass then absorbs a great deal of heat energy, since light is actually passing through the glass twice.
- While dichroic filters can be used in wet environments, the coatings are porous and will absorb moisture. When this occurs, the film swells and causes a color shift. As the coating heats up and the moisture evaporates out of the coating, the film will shrink back down to the correct thickness and the color will shift back accordingly.
- Glass breaks. Insure that the application and installation take safety into consideration.

## REFERENCE CHART

Permacolor	Roscolux
#36500 Primary Red	R27
#36100 Flame Red	R25
#35900 Orange	R22
#35600 Medium Orange	R20 / R21
#35401 Amber	R14 / R15
#35200 Yellow	R312
#34959 Light Yellow Green	R86 / R87
#35156 Fern Green	R89
#35055 Primary Green	R389+
#34853 Turquoise	R93 / R94
#35700 Sea Blue	RCC4390 (CalColor Cyan 90)
#35590 Cyan	R69+
#35400 Sky Blue	R65 / R67
#35100 Light Blue Green	R68-
#31080 Primary Blue	R68+
#34600 Medium Red Blue	R359 / R55
#34200 Deep Purple	R59+
#33650 UV "Woods Glass"	N/A
#34965 Lavender	R245 / R57
#34640 Vivid Magenta	R344 (x2)
#34763 Deep Magenta	R48
#34630 Hot Pink	R44 / R344
#34758 Medium Pink	R43+
#31033 Light Pink	R33
#31337 Pale Pink	R337
#31018 Amber Blush	R18
#31002 Bastard Amber	R02
#31013 Golden Rod	R13
#31086 Industrial Green	R86 (x3)
#31073 Peacock Blue	R73
#31065 Mediterranean Blue	R65
#31062 Booster Blue	R62
#31055 Lilac	R55
#31054 Lavender Accent	R54
#31048 Purple Fuchsia	R48

# Other Rosco Products

## STANDARD STEEL GOBOS

After color filters, steel gobos are probably the lighting designers' most widely used tools. When positioned in the optical path of theatrical spotlights, gobos will create shapes, shadows or texture and even project images or symbols.

Rosco offers hundreds of different designs and styles of standard gobos. These are generally available at theatrical supply houses throughout the world and can be purchased in sizes to fit theatrical spotlights or moving lights. The Rosco Gobo Catalog displays several hundred of the most popular designs. Alternatively the entire collection is available on the Rosco web site at [www.rosco.com/gobocatalog/contents.html](http://www.rosco.com/gobocatalog/contents.html)

## CUSTOM GOBOS, STEEL AND GLASS

Virtually any black and white image or logo can be made into an inexpensive steel gobo at Rosco's laboratory in Texas. Steel gobos are etched from 5 mil, hard rolled stainless steel.

Rosco produces five different types of custom glass gobos, from high resolution black and white for photographic images, to one, two three or more color gobos. For three or more colors, another option are high definition photogobos.

For fast service and more information on custom gobos, contact Rosco by phone at 1-866-228-2256 or on the Rosco web site at [www.rosco.com/gobocatalog/customgobo/custom.html](http://www.rosco.com/gobocatalog/customgobo/custom.html)

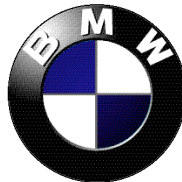
### EXAMPLES OF CUSTOM SPECTRUMGOBOS:



**B & W  
HIGH RESOLUTION**



**ONE COLOR**



**TWO COLOR**



**MULTI-COLOR**



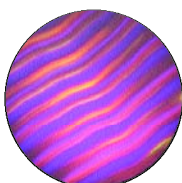
**HIGH DEFINITION  
PHOTOGOBO**

## GLASS GOBOS

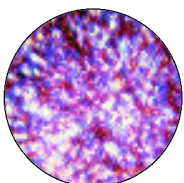
Rosco offers five different types of standard glass gobos, many available off the shelf at theatrical supply dealers.

When used in Rosco Gobo Rotators, these gobos offer designers the opportunity to create such effects as rain, fire, snow, etc. They are often used without rotators to create brilliant background textures or colors. All Rosco glass gobos are available in sizes to fit theatrical spotlights, and many are available in moving light sizes as well.

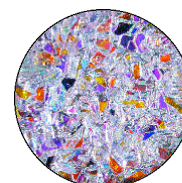
See the Rosco Gobo Catalog for a complete selection of these gobos at: [www.rosco.com/gobocatalog/glass.html](http://www.rosco.com/gobocatalog/glass.html)



**COLORWAVES**  
33005  
**WAVES - INDIGO**



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"... the Art of the Theatre is neither acting nor the play, it is not the scene nor dance, but it consists of all the elements of which these things are composed: action, which is the very spirit of acting; words, which are the body of the play; line and colour, which are the very heart of the scene ...

One is no more important than the other, no more than one colour is more important to a painter than another, or one note more important than another to a musician."

– Edward Gordon Craig  
1911



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