

A black and white photograph showing a person's left hand holding a light meter, with their right hand held open and palm facing up. The light meter is a Minolta model, as indicated by the text on its side. The background is a gradient from light blue to dark blue.

rosco

FILTER FACTS

**A handbook on using
Rosco filters for
controlling light
in film and video
production.**

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Photography credit for photos shown on pg. 18 and pg. 20:

Photography by: Joanne A. Calitri, International, Faculty, Brooks Institute of Photography, Santa Barbara, CA
First Assistant and Digital Technician: Dawn M. Gaietto, Master Student, Brooks Institute of Photography
First Assistants: Sarah "Wolfie" Pfrommer, Undergraduate Student, Brooks Institute of Photography
Joe Briscoe, Undergraduate Student, Brooks Institute of Photography
Second Assistant, Model: Lisa Bailey, Undergraduate Student, Brooks Institute of Photography
Model, Third Assistant, Stylist: Rebecca Sevy, Undergraduate Student, Brooks Institute of Photography
Third Assistants: Eric Hayne, Undergraduate Student, Brooks Institute of Photography

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ROSCO FILTERS FOR FILMMAKING, STILL PHOTOGRAPHY AND TELEVISION PRODUCTION

Rosco's Academy Award® winning system of Cinegel light-control materials consists of nearly 100 materials for color correction, light reduction, diffusion or reflection. Cinegel was first introduced over 40 years ago when most production was done on sound stages or in studios and the need for filters was limited. Back then, if productions moved out on location the light sources were usually a mix of natural daylight, carbon arc and tungsten, so a small range of blue and amber filters was generally sufficient for raising and lowering the Kelvin temperature.



Following the energy crisis of the 1970's efficiency became the main consideration in the design of light sources. HMI, CID and Xenon lamps were advanced for the film industry, while mercury, sodium and metal-halide joined fluorescent lamps in commercial and household usage. But since these new sources were neither tungsten nor daylight, they yielded an unflattering green rendition when photographed. For this reason Rosco developed Minusgreen and Plusgreen filters in the early 1980's. Also from that period, Rosco original designs include Opal Frost, Grid Cloth, Acrylic Panels, and Silver-Black Roscoscrim. Since then Rosco has continually advanced the development of new filters and diffusion materials to meet the changing needs of the lighting professional. In the 1990's, CT Straws were first introduced by Rosco as an alternative to the redder CTO filters. Cinelux was introduced as the wide-width color effects lighting filter, while The Storaro Selection was developed to suit the

spectral palette of the pre-eminent cinematographer for which it is named. In 1999, CalColor earned Rosco a second Academy Award for a calibrated and predictable series of cc color effects filters designed specifically to the spectral sensitivity of film emulsions. The latest advancement is Cinedichro, a range of high-temperature glass color correction filters designed for the hottest high-wattage lamps.



E-Colour joined the Rosco family of lighting filters in the early 1990's as an economical coated product with European nomenclature.

This booklet outlines all of these filters and provides technical information and guidelines for their use. These words from a famous cinematographer sum it all up, "Control the light, its color, its quality, its texture—and you control the look of the film".

The information contained in this booklet can also be found on the Rosco website (www.rosco.com) where it is updated regularly and new products are added as they become available.

Standards and Manufacturing Methods

Cinegel (pg 6-21), CalColor (pg 22-23), Cinelux (pg 24), and The Storaro Selection (pg 24) color filters are all meticulously manufactured with a heat-resistant PET polyester base, utilizing a patented deep-dye technology. Reflector Materials (pg 25) are multi-layered, metallized and laminated PET polyester with a vinyl backing. Diffusion Materials (pg 19-21) are either "Tough" PET polyester or "Soft" PVC vinyl. E-Colour (pg 26-28) is carefully manufactured on a heat-resistant PET polyester base, utilizing an advanced dye-coating process.

All Rosco filters are designed to the strictest industry standards. In manufacturing, they are inspected against rigid quality-control requirements for color and density using computerized on-line colorimeters and densitometers. This guarantees a consistent and reliable product.

Except as noted, all products are available in rolls 48 in. x 25 ft. (122cm x 7.6m). Cinegel, Cinelux, CalColor and The Storaro Selection are available in sheets 20 in. x 24 in. (50cm x 60cm), while E-Colour sheets are 21 in. x 24 in. (53cm x 60cm). Polarizing Filter is 19 in. x 20 in. (48cm x 50cm).

Sun 85, N.15, N.3, N.6, N.9, Sun 85N3, and Sun 85N6 rolls are extra-wide 60 in. x 20 ft. (152cm x 6.09m) for seamless installation on windows. Silent Grid Cloth, Silent Light Grid Cloth, Silent ½ Grid Cloth are extra-wide 60 in. x 20 ft. (152cm x 6.09m). Hilite rolls are 54 in. x 22 ft. (137cm x 4.8m). Wide Soft Frost rolls are 72 in. x 25 ft. (182cm x 4.8m).

LIGHT AND IMAGING

LIGHT AND THE HUMAN EYE

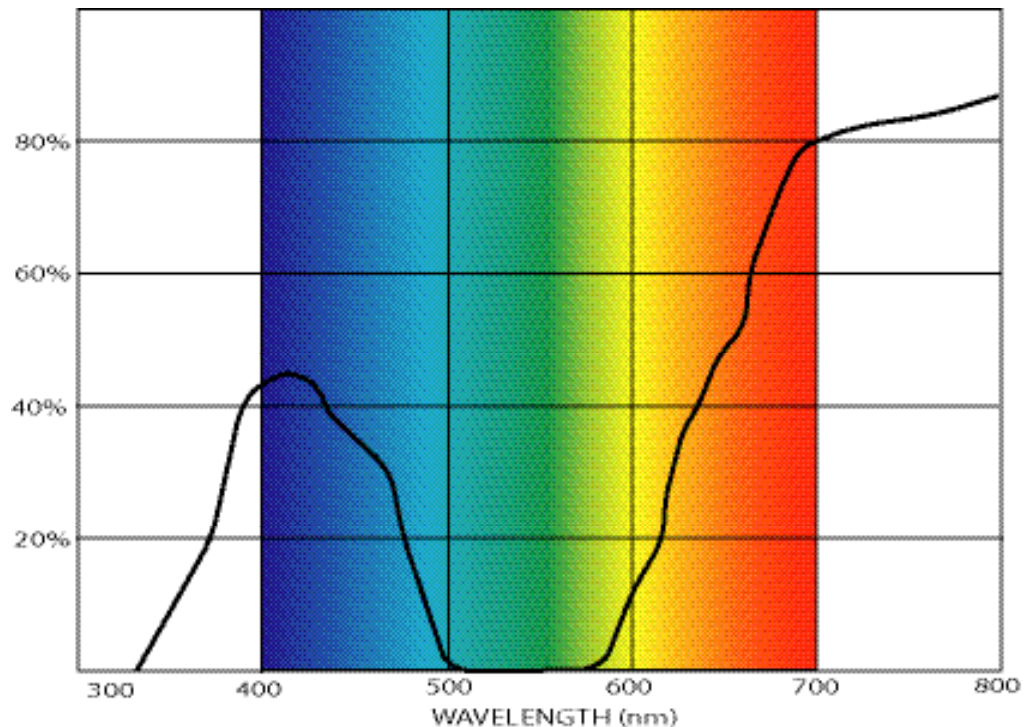
Visible light as perceived by the human eye is comprised by a narrow band of electromagnetic energy in the 400-700 nanometer wavelength range, being bounded below 400nm by ultraviolet and above 700nm by infrared. This visible light region is composed of a spectrum of colors roughly delineated as follows:

Violet 400-430 nm
Blue 430-490nm

Green 490-560nm
Yellow 560-590nm

Orange 590-630nm
Red 630-700nm

Because of adaptive properties of the human brain, all light containing some primary components of blue, green and red energy will generally be perceived as "white light".



The Spectral Energy Distribution Curve (SED) is a graphic representation of a color. The area under the curve is transmitted. The color shown combines blue-violet components with orange-red.

LIGHT, FILM EMULSIONS AND ELECTRONIC IMAGING SYSTEMS

Unlike the human eye, color film emulsions are designed to record a specific type of light as white light. Accordingly, emulsions are usually designated as either "tungsten balanced" or "daylight balanced". When exposing a film emulsion to a light source for which it *is not* designed, lens filters or printing filters are usually employed to adjust the color balance of the emulsion to match the color properties of the particular source.

In video and digital photography, the white balance feature often replaces a lens filter by permitting some electronic adjustment of the camera's color sensitivity to the color properties of a particular light source.

FINDING THE FILTERS YOU NEED TO ACHIEVE AN OVERALL CORRECTION

1. Establish the Reference

The predominant source in the scene is usually treated as the reference source for color correction. Usually that source is either 3200K Tungsten or 5500K Daylight. However, with Rosco filters, one could correct to fluorescents, discharge lamps, or any other reference.

2. Determine the kelvin and CC values

Determine the kelvin temperature of the reference source as well as all supplemental sources. If working with fluorescents or discharge lamps, also determine their green output with a color temperature meter. In video, a vectorscope or color monitor can also be useful for this purpose.

3. Select the Filters

Using the information provided in this booklet or in the Cinegel and E-Colour swatchbooks, determine the appropriate filter(s) for correcting the supplemental source to the reference. For "pure" tungsten or daylight, a blue or amber filter to adjust kelvin will suffice. For fluorescents and discharge lamps, a green or magenta CC correction will be required as well.

4. Overall Correction

Once all sources are balanced to the reference to achieve an overall consistency, it may still be necessary to balance the overall scene to an emulsion reference or video white balance. This final correction can be accomplished with a lens filter, in the lab, or through electronic white balance.

SOME NOTES ON FILTERS

Lens Filters versus Lighting Filters

Lens filters, printing filters, white balance and post production are all intended to provide *overall* color correction or color effect to a scene. Lighting filters, being applied to individual light sources, provide color correction, color effect and diffusion to *selective* elements within that scene.

Color Correction Filters for Film Emulsions versus Electronic Imaging Systems

As a general rule, electronic imaging systems such as video usually require half the color correction of film emulsions. For Neutral Density filters, however, the same principles apply for both film and video.

COLOR TEMPERATURE

KELVIN COLOR TEMPERATURE (K)

This is the scientific temperature scale used to designate the spectral output of a radiant element such as a lamp filament sufficiently heated so that it emits visible light. Such heated elements will then produce a continuous visible spectrum, with some output at all wavelengths. Examples include incandescent and tungsten sources, as well as natural daylight.

Simply put, a lower kelvin temperature indicates a relatively higher amber output, while a higher kelvin temperature corresponds to a relatively higher blue output.

CORRELATED COLOR TEMPERATURE (CCT)

This is a term often applied to arc sources that do not employ a heated filament and thus do not produce a continuous visible spectrum. Examples include fluorescent lamps and industrial discharge lamps.

For color correction purposes in film and electronic imaging, the manufacturer's suggested Correlated Color Temperature of these sources should not be employed, unless the accompanying Color Rendering Index (CRI) exceeds a value of 90 (e.g. HMI or Electronic Strobe).

COLOR TEMPERATURE AND MIRED SHIFT VALUE

The kelvin color temperature scale is not the best method for predicting the effect of color correction filters. This is because the resulting kelvin temperature will vary, depending upon the kelvin temperature of the original source. For example, Half Blue will increase kelvin 900 degrees for a 3200K source, yet only 600 degrees for a 2600K source, and 1500 degrees for a 4000K source.

Mired Shift Value is a constant value. It provides an accurate method for predicting the effect of a color correction filter regardless of the kelvin temperature of the original source. It also allows for predictable results when combining filters, since the mired shift values are additive or subtractive.

$$\frac{1,000,000}{\text{Filtered Source K}} - \frac{1,000,000}{\text{Original Source K}} = \text{Mired Shift Value}$$

Example: converting 5500°K to 3200°K

$$\frac{1,000,000}{3200^{\circ}\text{K}} - \frac{1,000,000}{5500^{\circ}\text{K}} = 313 - 182 = 131 \text{ (Roscon 85)}$$

Note: This process of calculating mired shift value is vastly simplified through the use of the Rosco Filter Nomograph (pg. 8). In addition, Rosco offers an easy to use, electronic calculator that determines either the required filter or the resulting kelvin from selected filters. Both the Filter Nomograph and the Electronic Calculator are available for free download at www.rosco.com.

PHOTOGRAPHIC LIGHT SOURCES

Natural Daylight

Natural Daylight is generally defined as a combination of sunlight and skylight on a clear day. At noon during the summer it is usually in the 5400°K- 6500°K range, with 5500°K being standardized as "photographic daylight". But natural daylight can vary considerably depending upon geographic latitude, time of year, time of day, as well as local atmospheric conditions. As a general rule, early morning and late afternoon daylight will have a greater amber content and a lower color temperature, in the 4000°K-4500°K range. Overcast skies will yield greater blue content and a higher color temperature, in the 7000°K-9000°K range. Sunrise or sunset will be very amber, in the 2000°K-2500°K range.

Artificial Daylight (HMI, Strobe, Xenon, White-Flame Carbon Arcs)

Throughout the years a number of artificial light sources have been developed to replicate the color properties of natural photographic daylight. In still photography, photographic strobes have become commonplace for this purpose. Similarly, in motion picture applications, White Flame Carbon Arcs were originally used, but have now been gradually replaced by HMI and Xenon lamps.

Photographic strobes generally produce good photographic color rendering and this remains stable throughout the life of the unit. Some variation can be found among manufacturers and models, but color temperature usually falls within the 5500°K-6500°K range.

Xenon lamps have excellent and very stable photographic color rendering throughout their life. Color temperature is usually in the 6000°K-6300°K range.

HMI lamps have good photographic color rendering in the 5000°K- 6500°K range. However there can be noticeable variation in the green output. Additionally, throughout their life individual lamps will shift to amber by losing 1 degree Kelvin per hour. As a group, these Artificial Daylight Sources cannot be dimmed to any reasonable degree to adjust for intensity and they are likely to produce higher levels of near-ultraviolet energy.

Tungsten-Halogen and Household Incandescent Lamps

Tungsten-halogen sources, often called "quartz lights" or "hot lights", have extremely stable color temperature and good photographic color rendering throughout their life. They are generally rated at 3200°K when operated at full voltage. When dimmed or operated at lesser voltage, their color temperature will be lower, usually in the 2400°K-3100°K range, resulting in a color shift towards amber.

Household incandescent bulbs will have color temperatures in the 2400°K-3000°K range, depending upon wattage.

Generally, lesser wattage equals lower color temperature and a corresponding color shift towards amber. Like tungsten-halogen, their color temperature also decreases when dimmed or when operated at lower voltage.

INDUSTRIAL DISCHARGE LIGHT SOURCES (Fluorescent, Mercury, Sodium, Metal-Halide)

These lamps produce visible light by means of an electrical arc within a gas enclosure. Most produce an inconsistent color spectrum although their color properties are often improved with the addition of phosphor coatings or metal additives. As a broad class these lamps exhibit a wide variety of photographic color rendering, ranging from acceptable to very poor. As a result, the use of manufacturer's color temperature data is usually inappropriate for photographic purposes and the use of a color temperature meter is strongly suggested.

Fluorescent Lamps

Fluorescent lamps remain the predominant type of interior lighting for commercial and industrial settings. They are also common for some household applications. As a class fluorescent lamps produce a wide variety of photographic color rendering depending upon manufacturer and type. Photographically, they can range from warm (amber) to cool (blue), although green output is usually high for all types.

Specialized full-spectrum fluorescent lamps are available, but care must be taken to insure that they are photographic full-spectrum. Even when so, they usually require some minor color correction.

Mercury Vapor

This class of lamp is best identified by its pale blue visual appearance. It is commonly found outdoors as street lighting and is widely used in factories and warehouses. All types have excessive green and blue output. The clear version of this lamp has very poor photographic color rendering with no red output. Color-improved or phosphor-coated versions are usable, but require significant filtration for photographic purposes.

Sodium Vapor

There are two general classes of Sodium Vapor Lamps - low pressure sodium and high pressure sodium.

Low Pressure Sodium is best identified by a distinct orange appearance. It is sometimes used as security lighting or in parking areas. Outside the USA, it is often found as highway lighting. It is a monochromatic orange source with no other color rendering. It therefore cannot be color corrected for photographic purposes.

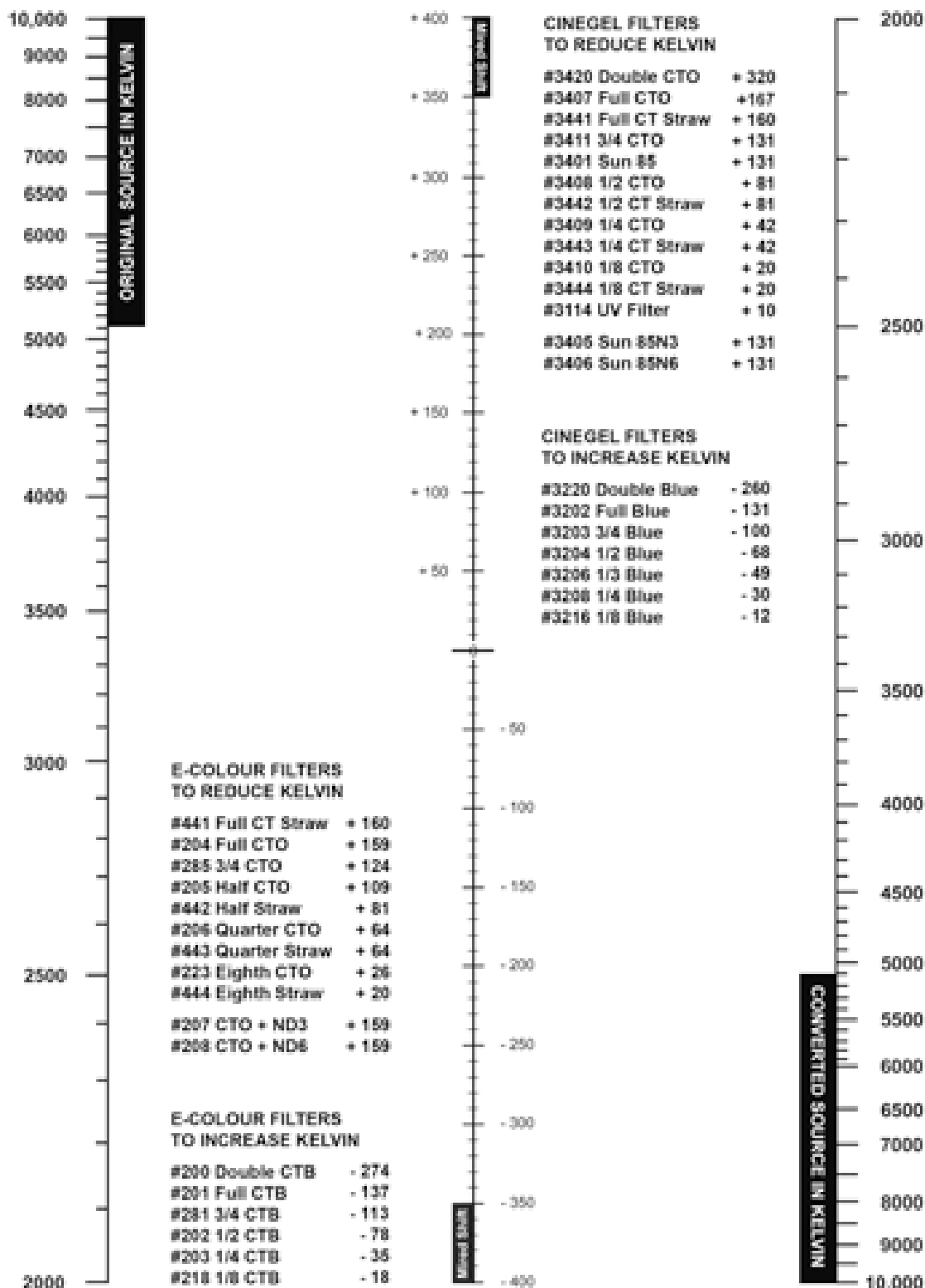
High Pressure Sodium is best identified by a pale straw visual appearance. It is generally found outdoors as street lighting, and is widely used in factories and warehouses. Its output has considerable yellow and green with some red and very little blue. It produces usable color rendering but requires significant filtration for photographic purposes.

Metal-Halide

These are mercury vapor lamps that contain metal additives for improved color rendering. They are widely used for commercial applications where color rendering is important, including sports stadiums, stores, malls and atriums. They generally produce good color rendering, close to natural daylight, but usually with some excess green. HMI, detailed above, is a specialized version of this lamp.

COLOR TEMPERATURE CALCULATOR FOR CINEGEL AND E-COLOUR FILTERS

Use this calculator to find the appropriate filter for color temperature conversion. With a straight-edge, draw a line from the kelvin temperature of the original source to the kelvin temperature for the converted source. This line will intersect the center line to indicate the respective Mired Shift Value. Use this value to find the suitable Cinegel or E-Colour filter from the charts.



Note: This calculator is only suitable for light sources having a continuous spectrum. It should not be used for a Fluorescent or Discharge source unless the CRI (Color Rendering Index) of that source exceeds a value of 90.

Rosco's range of color correction filters, diffusion, and reflection was honored by the Academy of Motion Picture Arts and Sciences with an Academy Award® for "the development of a complete system of light-control materials for motion-picture photography".

A QUICK REFERENCE GUIDE TO CINEGEL CORRECTION FILTERS

PRODUCT	DESCRIPTION	MIRE D SHIFT	TRANS.
To Increase Kelvin			
3202 Full Blue CTB	Converts 3200°K tungsten to 5500°K daylight	-131	36% (-1.5s)
3203 Three-Quarter Blue CTB	Converts 3200°K tungsten to 4700°K daylight	-100	41% (-1.3s)
3204 Half Blue CTB	Converts 3200°K tungsten to 4100°K.	-68	52% (-.9s)
3206 Third Blue CTB	Converts 3200°K tungsten to 3800°K.	-49	64% (-.6s)
3208 Quarter Blue CTB	Converts 3200°K tungsten to 3500°K.	-30	74% (-.4s)
3216 Eighth Blue CTB	Converts 3200°K tungsten to 3300°K.	-12	81% (-.3s)
3220 Double Blue CTB	Converts 2800°K tungsten to 10,000°K daylight.	-260	10% (-3.3s)
To Decrease Kelvin			
3407 Full CTO	Converts 6500°K daylight to 3200°K tungsten (or 5500°K to 2900°K).	+167	47% (-1.1s)
3411 Three-Quarter CTO	Converts 5500°K daylight to 3200°K tungsten.	+131	58% (-.8s)
3408 Half CTO	Converts 5500°K daylight to 3800°K.	+81	73% (-.5s)
3409 Quarter CTO	Converts 5500°K daylight to 4500°K.	+42	81% (-.3s)
3410 Eighth CTO	Converts 5500°K daylight to 4900°K.	+20	92% (-.1s)
3420 Double CTO	Converts 10,000°K daylight to 2400°K.	+320	23% (-2.1s)
3441 Full Straw CTS	Converts 5500°K daylight to 3200°K tungsten.	+160	50% (-1.0s)
3442 Half Straw CTS	Converts 5500°K daylight to 3800°K.	+81	73% (-.5s)
3443 Quarter Straw CTS	Converts 5500°K daylight to 4500°K.	+42	81% (-.3s)
3444 Eighth Straw CTS	Converts 5500°K daylight to 4900°K.	+20	92% (-.1s)
To Add Green			
3304 Tough Plusgreen	CC30 Green when balancing to fluorescent/discharge lamps.	N/A	76% (-.4s)
3315 Tough ½ Plusgreen	CC15 Green when balancing to fluorescent/discharge lamps.	N/A	90% (-.2s)
3316 Tough ¼ Plusgreen	CC075 Green when balancing to fluorescent/discharge lamps.	N/A	92% (-.1s)
3317 Tough ⅓ Plusgreen	CC035 Green when balancing to fluorescent/discharge lamps.	N/A	93% (-.1s)
To Remove Green			
3308 Tough Minusgreen	CC30 Magenta for balancing fluorescent/discharge lamps.	N/A	55% (-.9s)
3309 Tough ¾ Minusgreen	CC22.5 Magenta for balancing fluorescent/discharge lamps.	N/A	65% (.6s)
3313 Tough ½ Minusgreen	CC15 Magenta for balancing fluorescent/discharge lamps.	N/A	71% (-.5s)
3314 Tough ¼ Minusgreen	CC075 Magenta for balancing fluorescent/discharge lamps.	N/A	81% (-.3s)
3318 Tough ⅓ Minusgreen	CC035 Magenta for balancing fluorescent/discharge lamps.	N/A	89% (-.2s)
3310 Fluorofilter	Balances Cool White Fluorescent to Tungsten.	N/A	36% (-1.5s)
Window Correction and Neutral Density			
3401 Sun 85	Standard window correction. 5500°K daylight to 3200°K tungsten.	+131	58% (-.8s)
3415 ND .15	Reduces light intensity ½ stop.	N/A	70% (-.5s)
3402 ND .3	Reduces light intensity 1 stop.	N/A	50% (-1.0s)
3403 ND .6	Reduces light intensity 2 stops.	N/A	25% (-2.0s)
3404 ND .9	Reduces light intensity 3 stops.	N/A	12% (-3.0s)
3405 Sun 85 + ND .3	5500°K daylight to 3200°K tungsten plus 1 stop Neutral Density.	+131	33% (-1.6s)
3406 Sun 85 + ND .6	5500°K daylight to 3200°K tungsten plus 2 stops Neutral Density.	+131	17% (-2.6s)
3809 RoscoScrim	Perforated Silver/Black, useful as a 2 stop window scrim.	N/A	25% (-2.0s)
3421 Black Scrim	Perforated Black/Black, useful as a 2 stop window scrim.	N/A	25% (-2.0s)
3423 Cinescreen	A woven material, black on both sides. Reduces light 2 stops.	N/A	25% (-2.0s)
Arc Correction			
3114 Tough UV Filter	Absorbs excess ultraviolet from strobes, arcs and HMI.	+8	93% (-.1s)
3107 Tough Y1	Reduces color temperature of arcs and HMI.	+45	93% (-.1s)
3106 Tough MTY	Reduces color temperature of arcs and HMI.	+131	57% (-.8s)
3102 Tough MT2	Reduces color temperature of arcs and HMI.	+110	66% (-.6s)
3134 Tough MT54	Reduces color temperature of arcs and HMI.	+35	83% (-.3s)
3150 Industrial Vapor	Converts standard tungsten to sodium vapor.	+131	38% (-1.4s)
3152 Urban Vapor	Converts tungsten to an artistic looking sodium vapor w/o green.	N/A	29% (-1.8s)

FILTERS FOR NATURAL DAYLIGHT

The amber and neutral density filters described here are primarily used in an interior location that has windows or openings allowing daylight to enter. These filters are usually applied to the windows to permit color correction and/or neutral density light reduction. Except as noted, these rolls measure extra wide 60 in. x 20 ft. (152cm x 6.09m) for seamless installation on windows.

Natural Daylight Filtered to Tungsten Interiors

When tungsten is the primary interior source and natural daylight comes through windows, it is usually most practical to filter the daylight. Sun 85 is the standard daylight-to-tungsten correction, although any of the CTO or CTS filters shown on the next page are suitable for special conditions or aesthetic considerations. Neutral Density filters may then be added as needed to reduce the level of exterior natural daylight to balance with the interior.

NAME	DESCRIPTION	M.S.V.	TRANS.
3401 Sun 85	Standard window correction. 5500°K daylight to 3200°K tungsten.	+131	58% (-0.8s)

Tungsten Filtered to Daylight (see page 12)

Natural Daylight Filtered to Standard Fluorescent Interiors (Cool White, Daylight, SP-41)

Standard USA Cool White (elsewhere Daylight) and SP-41 fluorescents can be treated as daylight sources, except that they emit a light which has a distinct green cast. Film emulsions and video systems will usually register this fluorescent light as unflattering "green daylight". When these fluorescents are the primary interior source and natural daylight comes through windows, Tough Plusgreen is added to the windows (1/2 Plusgreen for video). Neutral Density filters may then be added as needed to reduce the level of exterior natural daylight to balance with the interior. This filtration will achieve an overall green cast which can then be removed with a lens filter, in the lab or through electronic white balance.

NAME	DESCRIPTION	M.S.V.	TRANS.
3304 Tough Plusgreen	Adds green to windows when balancing to standard fluorescent.	N/A	76% (-0.4s)
3315 Tough 1/2 Plusgreen	Adds green to windows when balancing to standard fluorescent.	N/A	90% (-0.2s)

Standard Fluorescent (Cool White, Daylight, SP-41) Filtered to Daylight (see page 13)

Natural Daylight Filtered to Other Fluorescents and Discharge Lamps (see pages 14-16)

Neutral Density Filters for Natural Daylight

When artificial daylight (HMI, Strobe, Xenon) are the primary interior source and natural daylight comes through windows, Neutral Density filters are usually applied to the windows to reduce the amount of exterior natural daylight to balance with the interior levels.

NAME	DESCRIPTION	M.S.V.	TRANS.
3415 ND .15	Neutral Density. Reduces light intensity 1/2 stop.	N/A	70% (-0.5s)
3402 ND .3	Neutral Density. Reduces light intensity 1 stop.	N/A	50% (-1.0s)
3403 ND .6	Neutral Density. Reduces light intensity 2 stops.	N/A	25% (-2.0s)
3404 ND .9	Neutral Density. Reduces light intensity 3 stops.	N/A	12% (-3.0s)
3809 RoscoScrim	Perforated Silver/Black, useful as a 2 stop window scrim.	N/A	25% (-2.0s)
3421 Black Scrim	Perforated Black/Black, useful as a 2 stop window scrim.	N/A	25% (-2.0s)

Neutral Density Combined with Sun 85 Correction

Two filters are designed to combine the effect of Sun 85 daylight-to-tungsten correction with additional Neutral Density light reduction of 1 or 2 stops.

NAME	DESCRIPTION	M.S.V.	TRANS.
3405 Sun 85 + ND .3	5500°K daylight to 3200°K tungsten plus 1 stop Neutral Density.	+131	33% (-1.6s)
3406 Sun 85 + ND .6	5500°K daylight to 3200°K tungsten plus 2 stops Neutral Density.	+131	17% (-2.6s)

Rigid Acrylic Panels

Amber and Neutral Density daylight control filters are also available in optically clear, rigid acrylic sheets measuring 4 ft. x 8 ft. (1.2m x 2.4m) or 5 ft. x 8 ft. (1.52m x 2.4m). They offer quick set-up, easy handling and multiple re-use.

NAME	DESCRIPTION	M.S.V.	TRANS.
3761 Roscolex 85	Standard window correction. 5500°K daylight to 3200°K tungsten.	+131	58% (-0.8s)
3751 Roscolex 1/2 CTO	Partial window correction. 5500°K daylight to 3800°K tungsten.	+81	73% (-0.5s)
3762 Roscolex N.3	Neutral Density. Reduces light intensity 1 stop.	N/A	50% (-1.0s)
3763 Roscolex N.6	Neutral Density. Reduces light intensity 2 stops.	N/A	25% (-2.0s)
3764 Roscolex N.9	Neutral Density. Reduces light intensity 3 stops.	N/A	12% (-3.0s)

A typical lighting situation film and video professionals meet every day. Daylight from the windows, fluorescent light from the ceiling and tungsten lighting supplied by the filmmaker. Rosco filters are available in every category to insure balanced lighting no matter how many diverse sources are used.



FILTERS FOR ARTIFICIAL DAYLIGHT

Artificial daylight sources such as HMI, Strobe and Xenon can vary in color temperature among themselves or when used with Natural Daylight. The CTO amber and CTS straw filters described here, along with the CTB blue filters on the following page, permit the cameraman or technician to adjust the source color temperature up or down to deal with these variations. The wide range of these correction filters also allows for individual creative choice in how warm or cool a daylight source will appear when photographed.

Artificial Daylight Filtered to Tungsten

When tungsten is the standard illumination in a scene and a few daylight sources are included, the daylight sources are usually filtered with the amber or straw filters shown below. In most cases, Full CTO or Full Straw is the standard artificial daylight-to-tungsten correction.

NAME	DESCRIPTION	M.SV.	TRANS.
3407 Full CTO	Converts 6500°K daylight to 3200°K tungsten (or 5500°K to 2900°K).	+167	47% (-1.1s)
3411 Three-Quarter CTO	Converts 5500°K daylight to 3200°K tungsten.	+131	58% (-0.8s)
3408 Half CTO	Converts 5500°K daylight to 3800°K.	+81	73% (-0.5s)
3409 Quarter CTO	Converts 5500°K daylight to 4500°K.	+42	81% (-0.3s)
3410 Eighth CTO	Converts 5500°K daylight to 4900°K.	+20	92% (-0.1s)
3420 Double CTO	Converts 10,000°K daylight to 2400°K.	+320	23% (-2.1s)
3441 Full Straw CTS	Converts 5500°K daylight to 3200°K tungsten.	+160	50% (1.1s)
3442 Half Straw CTS	Converts 5500°K daylight to 3800°K.	+81	73% (-0.5s)
3443 Quarter Straw CTS	Converts 5500°K daylight to 4500°K.	+42	81% (-0.3s)
3444 Eighth Straw CTS	Converts 5500°K daylight to 4900°K.	+20	92% (-0.1s)

Tungsten Filtered to Daylight (see page 12)

Amber Filters versus Straw Filters

Until recently CTO amber filters were the traditional standard for reducing the color temperature of daylight sources. In 1992 in response to cameramen's requests, Rosco expanded this offering by introducing the CTS series of color correction straws. With a slightly yellower coloration than the CTO ambers, the CTS straws represent a useful alternative when varying conditions (film emulsions and video systems, light sources and set, wardrobe and makeup) call for a correction that is less red.

Artificial Daylight Filtered to Standard Fluorescent (Cool White, Daylight, SP-41)

Standard USA Cool White (elsewhere Daylight) and SP-41 fluorescents can be treated as daylight sources except that they emit a light which has a distinct green cast. Film emulsions and video systems will usually register this fluorescent light as unflattering "green daylight". When these fluorescents are the primary interior source and artificial daylight sources are added, Tough Plusgreen is added to the daylight sources (1/2 Plusgreen for video). This overall green can then be removed with a lens filter, in the lab or through electronic white balance.

NAME	DESCRIPTION	M.SV.	TRANS.
3304 Tough Plusgreen	Adds green to daylight when balancing to standard fluorescent.	N/A	76% (-0.4s)
3315 Tough 1/2 Plusgreen	Adds green to daylight when balancing to standard fluorescent.	N/A	90% (-0.2s)

Standard Fluorescent (Cool White, Daylight, SP-41) Filtered to Daylight (see page 13)

Artificial Daylight Filtered to Other Fluorescents and Discharge Lamps (see page 14-16)

FILTERS FOR TUNGSTEN-HALOGEN AND INCANDESCENT LAMPS

The CTB filters described here along with the CTO and CTS filters described on the previous page, permit the cameraman or technician to adjust the source color temperature up or down in discrete steps. This range of correction also allows for individual creative choice of how cool or warm a tungsten or incandescent source will appear when photographed.

Tungsten Filtered to Daylight

When daylight is the predominant source in the scene and tungsten sources are added, the tungsten sources are filtered with the appropriate CTB blue filter from the chart below. Full Blue CTB is used as the standard tungsten-to daylight correction, but Half Blue CTB is better suited to match natural daylight conditions in early morning or late afternoon. Half Blue CTB is often a popular choice for fill light on talent, since it provides lesser correction and a warmer look with flesh tones.

For video or digital applications, Half Blue CTB is recommended as the standard tungsten-to-daylight correction.

NAME	DESCRIPTION	M.S.V.	TRANS.
3202 Full Blue CTB	Converts 3200°K tungsten to 5500°K daylight	-131	36% (-1.5s)
3203 Three-Quarter Blue CTB	Converts 3200°K tungsten to 4700°K daylight	-100	41% (-1.3s)
3204 Half Blue CTB	Converts 3200°K tungsten to 4100°K.	-68	52% (-0.9s)
3206 Third Blue CTB	Converts 3200°K tungsten to 3800°K.	-49	64% (-0.6s)
3208 Quarter Blue CTB	Converts 3200°K tungsten to 3500°K.	-30	74% (-0.4s)
3216 Eighth Blue CTB	Converts 3200°K tungsten to 3300°K.	-12	81% (-0.3s)
3220 Double Blue CTB	Converts 2800°K tungsten to 10,000°K daylight	-260	10% (-3.3)

Natural Daylight Filtered to Tungsten (see page 10)

Artificial Daylight Filtered to Tungsten (see page 11)

Tungsten Filtered to Standard Fluorescent (Cool White, Daylight, SP-41)

Standard USA Cool White (elsewhere Daylight) and SP-41 fluorescents can be treated as daylight sources, except that they emit a light which has a distinct green cast. Film emulsions and video systems will usually register this fluorescent light as unflattering "green daylight". When these fluorescents are the primary interior source and tungsten sources are added, Full Blue CTB is first applied to the tungsten sources, to raise their color temperature to daylight. Tough Plusgreen is then added so that the resulting scene is then lit as "green daylight". This overall green can then be removed with a lens filter, in the lab or through electronic white balance. For video or digital applications, Half Blue with Tough 1/2 Plusgreen is recommended.

NAME	DESCRIPTION	M.S.V.	TRANS.
3202 Full Blue CTB +	For Film, converts 3200°K tungsten and adds green	N/A	27% (-1.9s)
3304 Tough Plusgreen	when balancing to standard fluorescent.		
4360 CalCodor 60 Cyan	Adds sufficient levels of blue and green to tungsten fixtures for balancing to standard fluorescent.	N/A	63% (-.7s)

NAME	DESCRIPTION	M.S.V.	TRANS.
3204 Half Blue CTB +	For Video/Digital, converts 3200°K tungsten and adds	N/A	47% (-1.1s)
3315 Tough 1/2 Plusgreen	green when balancing to standard fluorescent.		
4330 CalCodor 30 Cyan	Adds sufficient levels of blue and green to tungsten fixtures for whitebalancing to standard fluorescent.	N/A	50% (-1.0s)

Standard Fluorescent (Cool White, Daylight, SP-41) Filtered to Tungsten (see page 13)

Tungsten Filtered to Other Fluorescents and Discharge Lamps (see pages 14-16)

Incandescent Filtered to Tungsten

As mentioned earlier, household incandescent bulbs will have color temperatures in the 2400K-3000K range, depending upon wattage. These bulbs are often filtered with blue correction filters to match 3200K tungsten. The chart below shows guidelines for this correction.

40-75 watt: #3204 Half Blue CTB 100-300 watt: #3208 Quarter Blue CTB 500-1000 watt: #3216 Eighth Blue CTB

Tungsten Filtered to Incandescent

3200K Tungsten is sometimes filtered with amber correction filters to match household incandescent bulbs. The chart below shows filter guidelines to match this condition.

40-75 watt: #3408 Half CTO 100-300 watt: #3409 Quarter CTO 500-1000 watt: #3410 Eighth CTO

Compensating for Dimmers

When Tungsten or Incandescent lamps are operated on dimmers, their color temperature will be lowered. The chart below shows filter guidelines to compensate for this color temperature shift.

80% Level: #3216 Eighth Blue CTB 40% Level: #3208 Quarter Blue CTB 20% Level: #3206 Third Blue CTB



If you've tried to shoot a film or video in a fluorescent-lit environment, such as this train station waiting room, you already know how inadequate and unflattering the light can be. That's why filmmakers and video professionals always supplement the available light with film lighting ... and why Rosco filters are so essential to balance these disparate light sources.

FILTERS FOR STANDARD FLUORESCENTS (COOL WHITE)

Standard USA Cool White (elsewhere Daylight) and SP-41 fluorescents can be treated as daylight sources except that they emit a light which has a distinct green cast. Film emulsions and video systems will usually register this fluorescent light as unflattering "green daylight".

Natural Daylight Filtered to Standard Fluorescents (see page 10)

Artificial Daylight Filtered Standard Fluorescents (see page 11)

Standard Fluorescents Filtered to Natural or Artificial Daylight

When natural or artificial daylight is the reference source, Tough Minusgreen is added to the fluorescents. This removes the excess green and thereby renders the fluorescent as 5500K photographic daylight. For video or digital photo applications, Tough 1/2 Minusgreen is recommended.

NAME	DESCRIPTION	M.S.V.	TRANS.
3308 Tough Minusgreen	Removes green to balance standard fluorescent to daylight	N/A	55% (-0.9s)
3313 Tough 1/2 Minusgreen	Removes green to balance standard fluorescent to daylight	N/A	71% (-0.5s)

Tungsten Filtered to Standard Fluorescents (see page 12)

Standard Fluorescents Filtered to Tungsten and Incandescent Lamps

When tungsten is the reference source, Fluorofilter is added to the fluorescents. This removes the excess green and reduces the color temperature to render the fluorescent as 3200K photographic daylight. For video or digital photo applications, Tough 1/2 Minusgreen combined with Half CTO is recommended.

NAME	DESCRIPTION	M.S.V.	TRANS.
3310 Fluorofilter	For Film, removes green to balance standard fluorescent to tungsten.	N/A	36% (-1.5s)

NAME	DESCRIPTION	M.S.V.	TRANS.
3408 Half CTO +	For Video/Digital, removes green to balance standard fluorescent to tungsten.	N/A	52% (-0.9s)
3313 Tough 1/2 Minusgreen			

FILTERS FOR OTHER FLUORESCENTS AND INDUSTRIAL DISCHARGE LAMPS

The term "Industrial Discharge Lamp" includes such diverse sources as fluorescent, HMI, Metal Halide, Mercury Vapor and Sodium Vapor lamps. For film, video or digital applications, the spectral output of these lamps differs widely, but most can be color corrected with Cinegel filters. The exceptions are Low Pressure Sodium and Clear Mercury, both of which are extremely limited in their spectral output.

For color correction purposes in film, video and digital imaging, the "Correlated Color Temperature" of these industrial discharge lamps should never be referenced unless the accompanying Color Rendering Index (CRI) exceeds a value of 90 (e.g. HMI or Electronic Strobe). For this reason the photographic color balance of these industrial discharge lamps is best measured with a three-color temperature meter such as available from Minolta or Gossen.

Using such a meter, the amber/blue spectrum of the lamp is first measured and then adjusted with the amber, straw or blue filters shown on page 9. The green spectrum is next measured and adjusted with the green or magenta filters, also detailed on page 9. "Finding the Correction Filter You Need" on page 5 describes this technique in detail.

Lacking such a color temperature meter the filter recommendations shown below can serve as broad guidelines for color correcting the most common fluorescent and discharge lamps that you will encounter on location. However, due to the many variables inherent in the lighting and photographic process, along with the batch differences within bulb and emulsion types, we strongly suggest that you test these recommendations beforehand photographically. Also note that for the fluorescent lamps the filter recommendations apply only to the T-12 versions of the lamp, since the T-5 and T-8 versions of these lamps usually exhibit significant color differences.

Lastly, remember that these filter recommendations are generally for film emulsions. For video or digital imaging, half the suggested filter recommendation is a general rule of thumb.

FLUORESCENT LAMPS

Find the manufacturer's fluorescent lamp designation in the chart below. The manufacturer's lamp designation is usually found on the bulb packaging or on the lamp itself. From this, determine the Lamp Group to which your lamp belongs. Next, determine whether you wish to correct the fluorescent, the tungsten or the daylight source. Based on this and the lamp group, use the filter recommendations on the following charts (pg 15, A, B, and C).

LAMP GROUP	General Electric (North America T-12)	Sylvania (North America T-12)	Philips (North America T-12)
F1	SPX-27	Incandescent or 27K	Ultralume 27, 27U or 827
F2	Warm White (WW)	Warm White (WW)	Warm White (WW)
F3	Warm Deluxe (WWX)	Warm Deluxe (WWX)	Warm Deluxe (WWX)
F4	SP-30	Designer 30 or D30	Spec 30 or 730
F5	SPX-30	Designer 830 or D830	Ultralume 30, 30U or 830
F6	SP-35	Designer 35 or D35	Spec 35 or 735
F7	SPX-35	Designer 835 or D835	Ultralume 35, 35U or 835
F8	Cool White (CW) Cool White (CW)		Cool White (CW)
F9	SP-41	Designer 41 or D41	Spec 41 or 741
F10	SPX-41	Designer 841 or D841	Ultralume 41, 41U or 841
F11	Cool Deluxe (CWX)	Cool Deluxe (CWX)	Cool Deluxe (CWX)
F12	Chroma 50	Design 50	Colortone 50
F13	SP-65	Designer 65 or D65	Daylight 65

LAMP GROUP	General Electric (Europe T-12)	Sylvania (Europe T-12)	Philips (Europe T-12)	Osram (Europe T-12)
F1	Polylux 827	827	Super 827	Lumilux 41 or 827
F2	29 Warm White	129 Warm White	29 Warm White	30 Warm White
F5	Polylux 830	830	Super 830	Lumilux 31 or 830
F6	35 White	135 White	35 White	23 White
F7	Polylux 835	835	Super 835	Lumilux 26 or 835
F8	33 Cool White	133 Cool White	33 Cool White	20 Cool White
F9	25 Natural/Universal	125 Natural/Universal	25 Universal White	25 Natural White
F10	Polylux 840	840	Super 840	Lumilux 21 or 840
F13	54 Daylight	154 Daylight	Daylight 54	10 Daylight



Most factory floors in North America are lit with industrial discharge lamps, such as sodium vapor or mercury vapor.

A: FLUORESCENT FILTERED TO TUNGSTEN OR DAYLIGHT

LAMP GROUP	FLUORESCENT TO TUNGSTEN	FLUORESCENT TO DAYLIGHT
F1	1/4 CTB	CTB + 1/4 CTB
F2	1/4 CTO + Minusgreen	1/2 CTB + Minusgreen
F3	1/4 CTO + 1/4 Minusgreen	CTB + 1/4 Minusgreen
F4	1/4 CTO + Minusgreen	1/2 CTB + Minusgreen
F5	1/4 CTO + 1/2 Minusgreen	1/2 CTB + 1/2 Minusgreen
F6	1/2 CTO + Minusgreen	1/3 CTB + Minusgreen
F7	1/2 CTO + 1/2 Minusgreen	1/3 CTB + 1/2 Minusgreen
F8	3/4 CTO + Minusgreen	Minusgreen
F9	3/4 CTO + Minusgreen	Minusgreen
F10	3/4 CTO + 1/2 Minusgreen	1/2 Minusgreen
F11	1/2 CTO + 1/4 Minusgreen	1/3 CTB + 1/4 Minusgreen
F12	3/4 CTO + 1/4 Minusgreen	1/4 CTB + 1/4 Minusgreen
F13	CTO + Minusgreen	1/4 CTO + Minusgreen

B: TUNGSTEN FILTERED TO FLUORESCENT

LAMP GROUP	TUNGSTEN TO FLUORESCENT	LENS FILTRATION (REVERSAL FILM)
F1	1/4 CTO	15C + 7M
F2	1/4 CTB + Plusgreen	17M
F3	1/4 CTB + 1/4 Plusgreen	7Y + 7M
F4	1/2 CTB + Plusgreen	15Y + 25M
F5	1/2 CTB + 1/2 Plusgreen	20Y + 20M
F6	1/2 CTB + Plusgreen	10Y + 22M
F7	3/4 CTB + 1/2 Plusgreen	32Y + 25M
F8	CTB + Plusgreen	37Y + 35M
F9	CTB + Plusgreen	37Y + 35M
F10	3/4 CTB + 1/2 Plusgreen	32Y + 25M
F11	3/4 CTB + 1/4 Plusgreen	32Y + 20M
F12	CTB + 1/4 Plusgreen	47Y + 27M
F13	CTB + 1/4 CTB + Plusgreen	50Y + 40M

C: DAYLIGHT FILTERED TO FLUORESCENT

LAMP GROUP	DAYLIGHT TO FLUORESCENT	LENS FILTRATION (REVERSAL FILM)
F1	CTO	55C + 25M
F2	1/2 CTO + Plusgreen	42C + 40M
F3	1/2 CTO + 1/4 Plusgreen	35C + 22M
F4	1/4 CTO + Plusgreen	25C + 32M
F5	1/4 CTO + 1/2 Plusgreen	20C + 20M
F6	1/8 CTO + Plusgreen	20C + 30M
F7	1/4 CTO + 1/2 Plusgreen	20C + 20M
F8	Plusgreen	10C + 25M
F9	Plusgreen	10C + 25M
F10	1/2 Plusgreen	5C + 12M
F11	1/4 CTO + 1/4 Plusgreen	17C + 15M
F12	1/4 CTO + 1/4 Plusgreen	17C + 15M
F13	1/4 CTB + Plusgreen	20M

FILTERS FOR OTHER FLUORESCENTS AND INDUSTRIAL DISCHARGE LAMPS

DISCHARGE LAMPS

Find the manufacturer's discharge lamp designation in the chart below. The manufacturer's lamp designation is usually found on the bulb packaging or on the lamp itself. From this, determine the Lamp Group to which your discharge lamp belongs. Next, determine whether you wish to correct the discharge, the tungsten or the daylight source. Based on this and the lamp group, use the filter recommendations on charts D, E, F.

LAMP GROUP	General Electric (North America)	Sylvania (North America)	Philips (North America)	
D1 - Low Pressure Sodium	SOX	SOX	SOX	
D2 - High Pressure Sodium	LUCALUX or LU	LUMALUX or LU	SDW	
D3 - Clear Mercury	HR	H	H	
D4 - Deluxe Mercury	HR/DX	H/DX	H/DX	
D5 - Metal Halide 3K	MVR/SP30 (730), MXR (732)	M3K,MH/3K	MH3K	
D6 - Metal Halide 4K	MVR (740)	M	MH	

LAMP GROUP	General Electric (Europe)	Sylvania (Europe)	Philips (Europe)	Osram (Europe)
D1 - Low Pressure Sodium	SOX	SLP	SOX	SOX
D2 - High Pressure Sodium	LU	SHP, SHX	SON	NAV
D3 - Clear Mercury	H	HSL/BW	HPL	HQL
D4 - Deluxe Mercury	H/NDX	HSL/SC	HPL COMFORT	HQL DELUXE
D5 - Metal Halide 3K	WDL, ARC/730, MVR/SP30	HSI/3K (WDL)	MHW	HQI/WDL
D6 - Metal Halide 4K	NDL/740, MVR/740	HSI/4K (NDL)	MHN	HQI/NDL

D: DISCHARGE LAMP FILTERED TO TUNGSTEN OR DAYLIGHT

LAMP GROUP	DISCHARGE LAMP TO TUNGSTEN	DISCHARGE LAMP TO DAYLIGHT
D1	Not Recommended	Not Recommended
D2	3/4 CTB, 2X Minusgreen	2X CTB, 2X Minusgreen
D3	Not Recommended	CTO, 1/4 CTO, Minusgreen, 1/4 Minusgreen
D4	CTO, 1/4 CTO, Minusgreen	1/4 CTO, Minusgreen, 1/2 Minusgreen
D5	1/4 CTO, 1/2 Plusgreen	CTB, 1/4 Plusgreen
D6	CTO, 1/4 CTO, Minusgreen	1/8 CTO, Minusgreen

E: TUNGSTEN FILTERED TO DISCHARGE LAMP

LAMP GROUP	TUNGSTEN TO DISCHARGE LAMP	LENS FILTRATION (REVERSAL FILM)
D1	Not Recommended	Not Recommended
D2	2X Plusgreen	22C + 50M
D3	Not Recommended	Not Recommended
D4	CTB, 3/4 CTB, Plusgreen	80Y + 55M
D5	1/3 CTB, 1/4 Minusgreen	15Y
D6	CTB, 1/2 CTB, Plusgreen	65Y + 50M

F: DAYLIGHT FILTERED TO DISCHARGE LAMP

LAMP GROUP	DAYLIGHT TO DISCHARGE LAMP	LENS FILTRATION
D1	Not Recommended	Not Recommended
D2	CTO, 1/2 CTO, Plusgreen, 1/2 Plusgreen	100C + 75M
D3	2X CTB, 2X Plusgreen	80Y + 75M
D4	3/4 CTB, Plusgreen, 1/2 Plusgreen	20Y + 40M
D5	3/4 CTO, 1/4 Minusgreen	50C + 15M
D6	1/2 CTB, Plusgreen	15Y + 25M

USING A COLOR MONITOR TO DETERMINE THE APPROPRIATE LIGHT SOURCE COLOR CORRECTION IN VIDEO APPLICATIONS

The following technique is suggested for determining color correction on location when shooting video. This technique is particularly useful when facing the vast variety of fluorescent and discharge lamps now found in industrial and commercial settings. It requires a color monitor and a bit of trial and error, but the results are quick and reliable. In addition to a color monitor, a vectorscope is useful but not required.

Note that this technique is not suitable when shooting film emulsion with video preview.

- 1) Determine the base reference light source in the scene. This is usually the predominant source and the one that will be left uncorrected.
- 2) Using a grey card fully framed, white balance on this reference source.
- 3) With this white balance now registered, illuminate the grey card solely with the supplemental source.
- 4) Using a color monitor, carefully judge the color shift that has occurred on the grey card. Is it blue or yellow? green or magenta?
- 5) Using color correction filter samples held in front of the camera lens, attempt to bring the coloration of the grey card back to neutral grey on the monitor.

In this step it is generally best to first alter the "warmness" or "coolness" of the grey card with a selection of CTB or CTO filters. Once satisfied, affix this filtration temporarily to the lens. Then repeat step 5 with a selection of Minusgreen or Plusgreen filters as needed to neutralize any remaining green or magenta coloration.

Your final filtration pack should not contain both CTO and CTB filters, since these opposing filters create neutral density and unnecessary light loss. The same applies to having both Minusgreen and Plusgreen filters together in the final filtration pack.

- 6) This final filtration pack should then be applied in larger sheets to all supplemental sources of this type.
- 7) Repeat steps 3-6 as needed for supplemental sources of different types.

CINEGEL CORRECTION FILTERS IN USE

CORRECTING CONTRAST WITH NEUTRAL DENSITY

High Contrast
Daylight + Daylight



Corrected Contrast With
Cinegel 3403 ND .6



CORRECTING TUNGSTEN

Uncorrected
Tungsten + Daylight



Tungsten Corrected
With Cinegel 3202
Full Blue



CORRECTING DAYLIGHT

Uncorrected
Tungsten + Daylight



Corrected Daylight
With Cinegel 3407
Full CTO



CORRECTING COOL WHITE

Uncorrected
Daylight + Cool White



Corrected Cool White
With Cinegel 3308
Full Minusgreen



CORRECTING MERCURY

Uncorrected
Daylight + Mercury

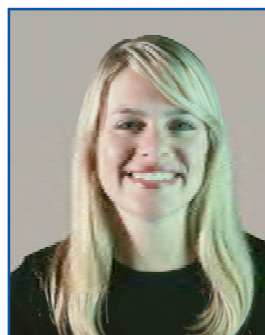


Corrected Mercury
With Cinegel 3409 1/4 CTO
+ Cinegel 3308
Full Minusgreen



CORRECTING SODIUM

Uncorrected
Tungsten + Sodium



Corrected Sodium
With Cinegel 3208
Quarter Blue
+ Cinegel 3308 Full
Minusgreen



Lighting fixtures for film and video production usually function by means of a reflector that gathers light from a high-wattage, point-source lamp. Often it focuses this light through a lens. The result is a more or less coherent beam that has a high level of intensity. The quality of the light from these fixtures may present problems. The beam field is often uneven, the beam edge may be too sharp, or the hard shadows created by the beam may be unflattering to the subject or objectionable in the scene.

Effective source size is a key element of control. Placed in the beam path, diffusion materials modify the harsh quality of the beam by spreading or dispersing the light effectively enlarging the source size. This softens the beam and, much like clouds or haze in the natural environment, alters the shadow-casting properties of the beam. Additionally, diffusion material serves to reduce the contrast ratio between highlight and shadow areas in the scene.

"TOUGH" DIFFUSION TYPES

The following diffusion groups are designated as "Tough". This term indicates that the base material is a heat-resistant polyester which can be used on most high-wattage lighting fixtures.

Tough Spun Group - Feathers the beam edge and smoothes the beam field. Beam shape is maintained with minimal beam spread. Slight contrast reduction. Not generally recommended on HMI's since the texture of the filter may be reproduced in the beam.

#3006 Tough Spun	#3022 Quarter Tough Spun
#3007 Light Tough Spun	

Tough Frost Group - A widely-used, general purpose group that offers slight-to-medium diffusion properties. Moderate beam spread while maintaining a discernible beam center. Moderate contrast reduction.

#3008 Tough Frost	#3040 Powder Frost
#3009 Light Tough Frost	#3020 Light Opal Tough Frost
#3010 Opal Tough Frost	

Tough White Diffusion Group - A popular series that offer moderate-to-dense diffusion properties. Medium-to-wide beam spread creating an even field of soft, flattering light. Noticeable contrast reduction.

#3026 Tough White Diffusion	#3028 Tough 1/4 White Diffusion
#3027 Tough 1/2 White Diffusion	

Tough Rolux Group - A dense diffuser with wide beam spread creating an even field of soft, shadowless light. Noticeable contrast reduction.

#3000 Tough Rolux	#3001 Light Tough Rolux
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Grid Cloth Group - A group of reinforced, woven polyester materials that offer dense diffusion properties. Wide beam spread creating an extremely soft, shadowless light. Considerable contrast reduction.

Note: Like fabric these materials can be sewn and grommetted yet are extremely durable. Ideal for tenting or large area coverage. The "Silent" versions are generally preferred outdoors, since their softened finish eliminates "wind noise".

#3030, 3032 and 3034 are produced 48 in. x 25 ft. (122cm x 7.6m).

#3060, 3062 and 3064 are produced 60 in. x 20 ft. (152cm x 6.09m).

#3030 Grid Cloth	#3060 Silent Grid Cloth™
#3032 Light Grid Cloth	#3062 Silent Light Grid Cloth™
#3034 Quarter Grid Cloth	#3064 Silent Quarter Grid Cloth™

Tough Silk Linear Diffusion - This is a unique diffuser with directional properties. It spreads the beam horizontally, vertically or diagonally to create a "slash" of light. Useful for smoothing out unwanted "beam scallop" caused by tight spaces and extreme lighting angles.

#3011 Tough Silk	#3015 Light Tough Silk
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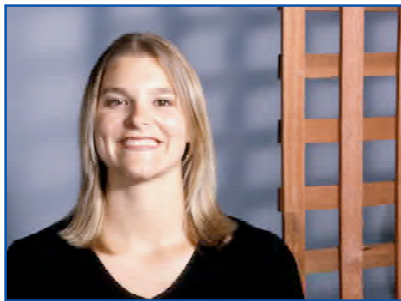
"SOFT" DIFFUSION TYPES

"Soft" diffusion materials are silent when used outdoors in windy conditions. Vinyl based, these materials are only moderately heat resistant so should never be used directly on high wattage lighting fixtures.

#3002 Soft Frost	#3014 Hilite (similar to #3010 Opal Frost)
#3004 Half Soft Frost	#3029 Silent Frost (similar to #3026 White Diffusion)



No Diffusion

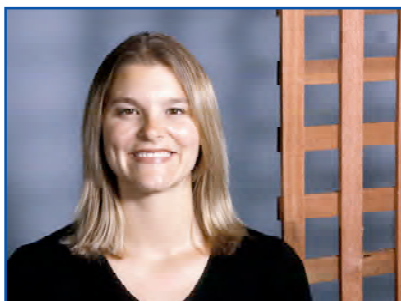


3010 Opal Tough Frost - At Source

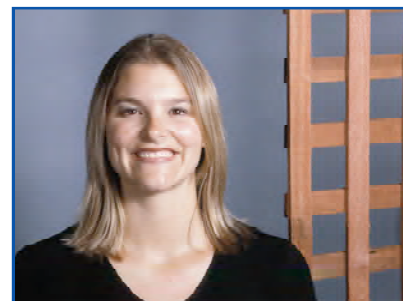


3010 Opal Tough Frost -
On Frame at 3 feet

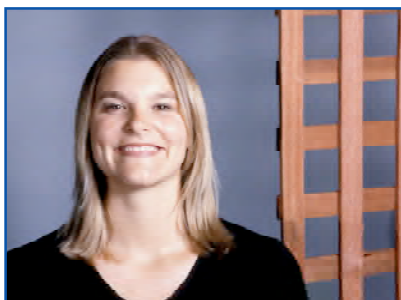
This page shows the subtle but significant results you can achieve with Rosco diffusion materials. We used the same model, set and film for each photo, changing only the Rosco diffusion materials. Note how results change when the same diffusion material is affixed at the source or in a frame placed at a distance from the source.



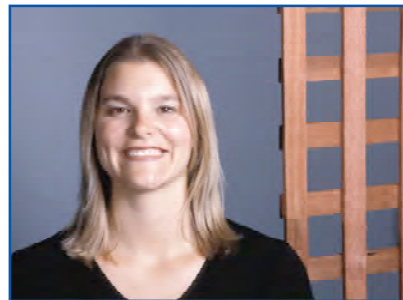
3014 Hilite - At Source



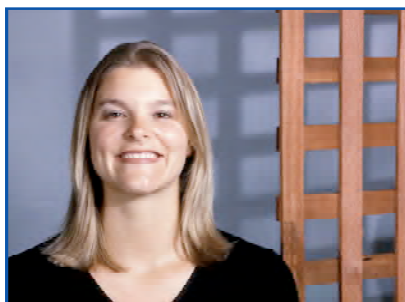
3014 Hilite -
On Frame at 3 feet



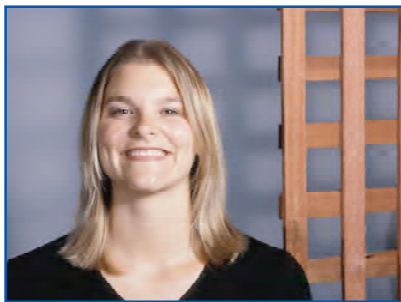
3027 1/2 Tough White - At Source



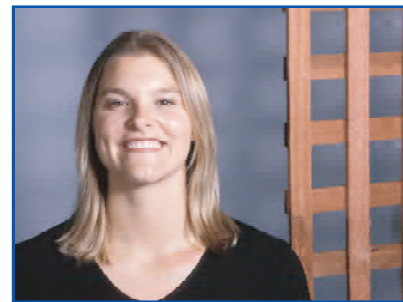
3027 1/2 Tough White -
On Frame at 3 feet



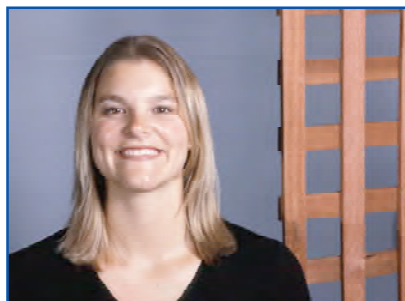
3007 Light Tough Spun - At Source



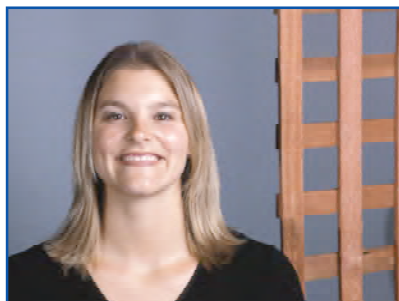
3009 Light Tough Frost - At Source



3028 1/4 Tough White - At Source



3026 Tough White Diffusion - At Source



3032 Light Grid Cloth - On Frame at 3 feet

BUTTERFLIES AND OVERHEADS

A number of Cinegel diffusion materials are available to fit the standard butterfly and overhead grip frames - 6x6, 8x8, 12x12, 20x20. All materials are supplied edge-finished with binding and grommets on 24" centers. Custom sizes and configurations are also available.

Grid Cloths - #3030, 3032, 3034, 3060, 3062 - have sewn seams.

Hilite #3014 and Silent Frost #3029 have ultrasonic welded seams.

TRANSMISSION LOSS FOR DIFFUSION MATERIALS

Transmission data for diffusion material is often confusing and misleading since transmission loss is dependent upon where the material is placed and how the measurement is taken. In fact, the term "loss" is a misnomer because the light is simply dispersed over a wider area, not lost.

For transmission, some filter manufacturers provide a densitometer measurement from a lab setting, but this yields artificially high transmission values. Instead, the following measurements are based on real conditions of usage. The chart shows transmission loss when the light source is placed 10 feet (305 cm) from the subject with the diffusion material placed either at the source or on a frame 3 feet (91 cm) out in front. All measurements are taken at the beam center.

Placing the diffusion material further out in front of the source generally yields both higher transmission and increased dispersion. This results in softer shadows as well as a lower contrast between the highlight and shadow areas (see photos on the previous page). This placement variable, combined with the number of diffusion choices, results in a vast range of alternatives for the user.

GROUP	PRODUCT	DIFFUSION AT SOURCE	DIFFUSION AT 3 FEET
SPUN:	3006 Tough Spun	17% (-2.6s)	22% (-2.2s)
	3007 Light Tough Spun	34% (-1.6s)	39% (-1.4s)
	3022 Quarter Tough Spun	39% (-1.4s)	48% (-1.1s)
FROST:	3008 Tough Frost	18% (-2.5s)	26% (-2.0s)
	3009 Light Tough Frost	36% (-1.5s)	48% (-1.1s)
	3010 Opal Tough Frost	42% (-1.3s)	51% (-1.0s)
	3040 Powder Frost	59% (-.8s)	68% (-.6s)
	3020 Light Opal	68% (-.6s)	84% (-.3 s)
WHITE DIFFUSION:	3026 Tough White Diffusion	9% (-3.5s)	18% (-2.5s)
	3027 Tough ½ White Diffusion	17% (-2.6s)	34% (-1.6s)
	3028 Tough ¼ White Diffusion	26% (-2.0s)	45% (-1.2s)
ROLUX:	3000 Tough Rolux	13% (-3.0s)	24% (-2.1s)
	3001 Light Tough Rolux	21% (-2.3s)	34% (-1.6s)
GRID CLOTH:	3030 Grid Cloth	3% (-5.5s)	6% (-4.2s)
	3032 Light Grid Cloth	10% (-3.0s)	18% (-2.5s)
	3034 Quarter Grid Cloth	14% (-3.0s)	24% (-2.1s)
	3060 Silent Grid Cloth	2% (-5.5s)	5% (-4.3s)
	3062 Silent Light Grid Cloth	3% (-5.0s)	7% (-3.8s)
	3064 Quarter Silent Grid Cloth	22% (-2.2s)	34% (-1.6s)
SILK:	3011 Tough Silk	36% (-1.5s)	51% (-1.0s)
	3015 Light Tough Silk	42% (-1.3s)	59% (-1.8s)
SOFT:	3002/3023 Soft Frost	13% (-3.0s)	21% (-2.3s)
	3004 Half Soft Frost	26% (-2.0s)	51% (-1.0s)
	3014 Hilite	39% (-1.4s)	59% (-.8s)

In color film three emulsion layers separately record the individual blue, green and red components of the visible spectrum. CalColor calibrated filters are unique in that they are specifically designed to the spectral sensitivity of these emulsion layers and allow for the adjustment of these color components at the light source. As a result, the cameraman or technician can exercise complete control over the coloration of selective elements within the scene *with totally predictable results*. This development represented such a significant innovation that it was granted a U.S. patent.

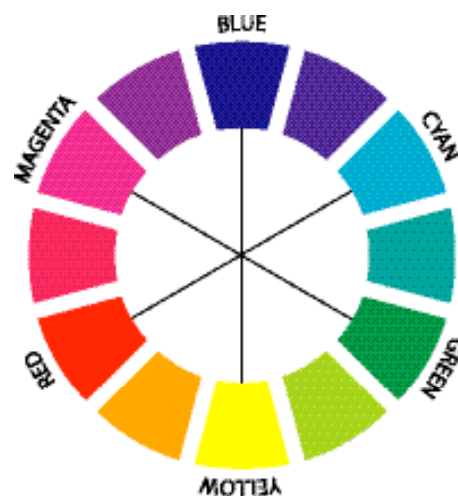
The CalColor system includes the primary colors Blue, Green and Red, the secondary colors Yellow, Magenta and Cyan, and two intermediary colors Pink and Lavender. Each color is produced in four densities: 15cc, 30cc, 60cc and 90cc, corresponding to the familiar 1/2, 1, 2, and 3 stop calibrations.

For example, a CalColor 90 Green filter selectively enhances green transmission by effectively reducing the blue and red transmission by a density of .90 or three stops. Similarly, a CalColor 90 Magenta filter selectively enhances blue and red transmission (creating magenta) by effectively reducing green transmission by a density of .90 or 3 stops.

CalColor and The Color Wheel

In addition to enhancing colors, CalColors can be used for neutralizing, subduing or darkening the *opposing* colors in a scene.

Blue Filter	Brightens blue. Strengthens cyan and magenta. Darkens yellow. Subdues red and green.
Green Filter	Brightens green. Strengthens cyan and yellow Darkens magenta. Subdues red and blue.
Red Filter	Brightens red. Strengthens yellow and magenta. Darkens cyan. Subdues blue and green.
Yellow Filter	Brightens Yellow. Strengthens red and green. Darkens blue. Subdues cyan and magenta.
Magenta Filter	Brightens magenta. Strengthens red and blue. Darkens green. Subdues cyan and yellow.
Cyan Filter	Brightens cyan. Strengthens blue and green. Darkens red. Subdues yellow and magenta.



Note: These principles also prove useful in black and white photography, since brighter tones are rendered as lighter grey and darker tones are rendered as darker grey.

Combining Calcolors

With their high degree of purity, CalColors can be combined with each other to produce a vast working palette of clean colors. The resulting combinations are also predictable for their photographic results - simply add together the component density values of the two filters. For example:

30 Cyan (30C) + 15 Blue (15C, 15M) = 45 Cyan with 15 Magenta (45C + 15M) = a Light Steel Blue Filter.

Other Uses

In addition to their use as color effects lighting filters, CalColor can serve a number of technical uses.

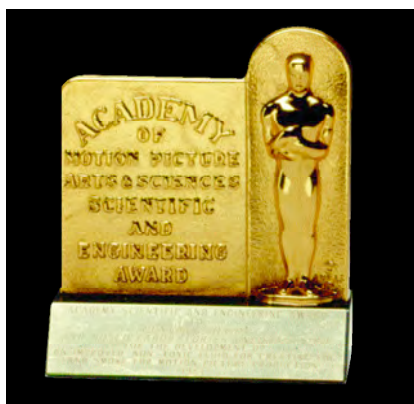
For bluescreen, greenscreen or redscreen digital compositing, the Blue, Green and Red primaries in the 60 or 90 density offer color enhancement for lighting the colored background. The complimentary Yellow, Magenta and Cyan tints in the 15 density then become useful for backlighting the subject. This backlighting will neutralize any spill from the background that would otherwise cause contamination or fringing in the matte.

CALCOLOR FILTERS: DENSITOMETRY

COLOR	Effective Loss Blue Exposure	Effective Loss Green Exposure	Effective Loss Red Exposure	Nominal C,Y,M Components
#4215 15 Blue	0.00	-0.14	-0.16	15M + 15C
#4230 30 Blue	0.00	-0.28	-0.32	30M + 30C
#4260 60 Blue	0.00	-0.57	-0.64	60M + 60C
#4290 90 Blue	0.00	-0.88	-0.95	90M + 90C
#4415 15 Green	-0.16	0.00	-0.13	15Y + 15C
#4430 30 Green	-0.31	0.00	-0.28	30Y + 30C
#4460 60 Green	-0.60	0.00	-0.59	60Y + 60C
#4490 90 Green	-0.89	0.00	-0.91	90Y + 90C
#4615 15 Red	-0.15	-0.15	0.00	15Y + 15M
#4630 30 Red	-0.30	-0.30	0.00	30Y + 30M
#4660 60 Red	-0.60	-0.58	0.00	60Y + 60M
#4690 90 Red	-0.89	-0.90	0.00	90Y + 90M
#4307 07 Cyan	0.00	0.00	-0.07	7C
#4315 15 Cyan	0.00	0.00	-0.15	15C
#4330 30 Cyan	0.00	0.00	-0.30	30C
#4360 60 Cyan	0.00	0.00	-0.59	60C
#4390 90 Cyan	0.00	0.00	-0.92	90C
#4515 15 Yellow	-0.15	0.00	0.00	15Y
#4530 30 Yellow	-0.30	0.00	0.00	30Y
#4560 60 Yellow	-0.61	0.00	0.00	60Y
#4590 90 Yellow	-0.91	0.00	0.00	90Y
#4715 15 Magenta	0.00	-0.15	0.00	15M
#4730 30 Magenta	0.00	-0.32	0.00	30M
#4760 60 Magenta	0.00	-0.64	0.00	60M
#4790 90 Magenta	0.00	-0.91	0.00	90M
#4815 15 Pink	-0.07	-0.15	0.00	07Y + 15M
#4830 30 Pink	-0.15	-0.31	0.00	15Y + 30M
#4860 60 Pink	-0.30	-0.60	0.00	30Y + 60M
#4890 90 Pink	-0.46	-0.90	0.00	45Y + 90M
#4915 15 Lavender	0.00	-0.15	-0.07	15M + 7C
#4930 30 Lavender	0.00	-0.30	-0.15	30M + 15C
#4960 60 Lavender	0.00	-0.61	-0.30	60M + 30C
#4990 90 Lavender	0.00	-0.90	-0.46	90M + 45C

CalColor Kit

The CalColor Kit (#4010) consists of 10" x 12" (25cm x 30cm) sheets of each of the colors in the range, packaged in a handy, reusable storage pouch.



The Academy of Motion Picture Arts and Sciences, recognizing CalColor as a "significant development", presented Rosco with an Academy Award® in 1999 for Technical Achievement.

CINELUX™

Cinelux is a selection of color effects filters from the Roscolux range which are produced in rolls 48" x 25' (122cm x 7.62m). They are ideally suited for use in film and television production where larger lighting fixtures are used and where color is often mounted on large grip frames. Like other Cinegel filters, Cinelux is manufactured with a patented deep-dye technology that locks the color into the high-temperature polyester base.

NAME	T%	x	y	NAME	T%	x	y
#02 Bastard Amber	78% (-0.4s)	0.491	0.407	#59 Indigo	2% (-5.7s)	0.232	0.127
#06 No Color Straw	92% (-0.1s)	0.464	0.418	#60 No Color Blue	62% (-0.7s)	0.401	0.391
#08 Pale Gold	86% (-0.2s)	0.481	0.417	#360 Clearwater	52% (-0.9s)	0.408	0.391
#310 Daffodil	82% (-0.3s)	0.498	0.450	#62 Booster Blue	54% (-0.9s)	0.376	0.389
#12 Straw	88% (-0.2s)	0.515	0.460	#362 Tipton Blue	32% (-1.6s)	0.368	0.374
#16 Light Amber	68% (-0.6s)	0.532	0.414	#364 Blue Bell	32% (-1.6s)	0.337	0.354
#316 Gallo Gold	58% (-0.8s)	0.531	0.409	#65 Daylight Blue	35% (-1.5s)	0.274	0.358
#17 Light Flame	56% (-0.8s)	0.546	0.398	#365 Tharon Delft Blue	36% (-1.5s)	0.362	0.364
#18 Flame	56% (-0.8s)	0.547	0.404	#376 Bermuda Blue	6% (-4.1s)	0.260	0.377
#318 Mayan Sun	52% (-0.9s)	0.571	0.379	#77 Green Blue	9% (-3.5s)	0.165	0.274
#21 Golden Amber	43% (-1.2s)	0.600	0.394	#378 Alice Blue	15% (-2.7s)	0.301	0.282
#321 Soft Golden Amber	39% (-1.4s)	0.565	0.399	#80 Primary Blue	9% (-3.5s)	0.160	0.210
#23 Orange	32% (-1.6s)	0.620	0.371	#83 Medium Blue	4% (-4.7s)	0.151	0.145
#26 Light Red	12% (-3.1s)	0.677	0.316	#87 Pale Yellow Green	85% (-0.2s)	0.453	0.430
#33 No Color Pink	65% (-0.6s)	0.478	0.382	#88 Light Green	82% (-0.3s)	0.453	0.450
#333 Blush Pink	71% (-0.5s)	0.467	0.386	#89 Moss Green	45% (-1.2s)	0.360	0.538
#34 Flesh Pink	45% (-1.2s)	0.522	0.366	#91 Primary Green	7% (-3.8s)	0.283	0.560
#37 Pale Rose Pink	56% (-0.8s)	0.476	0.372	#92 Turquoise	59% (-0.8s)	0.344	0.461
#39 Skelton Exotic Sangria	10% (-3.3s)	0.588	0.267	#93 Blue Green	35% (-1.5s)	0.314	0.453
#41 Salmon	24% (-2.1s)	0.633	0.343	#97 Light Grey	50% (-1.0s)	0.454	0.409
#42 Deep Salmon	8% (-3.7s)	0.650	0.314	#97 Pale Grey	70% (-0.5s)	0.455	0.408
#44 Middle Rose	26% (-2.0s)	0.529	0.313	#98 Medium Grey	25% (-2.0s)	0.457	0.408
#47 Light Rose Purple	26% (-2.0s)	0.437	0.302	#99 Chocolate	35% (-1.5s)	0.507	0.402
#51 Surprise Pink	54% (-0.9s)	0.442	0.379				

Note: x, y chromaticity coordinates are measured to Source A (tungsten).

THE STORARO SELECTION

Three-time Academy Award® winning cinematographer Vittorio Storaro is universally acknowledged for his masterful use of color in film lighting. Storaro chose Rosco to reproduce his personal palette of 10 richly saturated colors, representing key chromatic elements of the visible spectrum in a lighting filter range.

Like other Cinegel filters, The Storaro Selection is manufactured with a patented deep-dye technology that locks the color into the high-temperature polyester base.

NAME	T%	x	y	NAME	T%	x	y
#2001 VS Red	12% (-3.1s)	0.677	0.316	#2007 VS Blue	10% (-3.3s)	0.259	0.267
#2002 VS Orange	23% (-2.1s)	0.591	0.385	#2008 VS Indigo	4% (-4.5s)	0.233	0.164
#2003 VS Yellow	64% (-0.7s)	0.550	0.437	#2009 VS Violet	3% (-5.0s)	0.417	0.231
#2004 VS Green	15% (-2.7s)	0.277	0.629	#2010 VS Magenta	28% (-1.8s)	0.508	0.291
#2005 VS Cyan	18% (-2.5s)	0.239	0.441				
#2006 VS Azure	9% (-3.5s)	0.160	0.210				

Note: x, y chromaticity coordinates are measured to Source A (tungsten).

REFLECTION MATERIAL

Bounce light or reflected light has become an increasingly useful tool when time, budget or space are limited. These metallic or white surfaces can be softened by an embossing to create a pleasing quality of illumination.

Rosco's reflector materials offer a variety of choices that are lightweight, durable and convenient. The letter designation indicates the degree of surface texturing and quality of reflection.

These metallized materials are constructed with a reflecting surface laminated to a durable white backing, which is also useful as a softer reflector. They are designed for permanent mounting to reflector boards or other rigid surfaces such as foam-core or showcard.

# 3801 Roscoflex 'M' (Mirror)	Mirror surface for long throws.
#3802 Roscoflex 'H' (Hard)	Matches traditional "hard" reflector boards.
# 38 03 Roscoflex 'S' (Soft)	Matches traditional "soft" reflector boards.
#3804 Roscoflex 'SS' (Supersoft)	Wider coverage at shorter distances than Roscoflex 'S'.
#3805 Roscoflex 'G' (Gold)	Roscoflex 'S' combined with a warm gold tint.

These ultra-thin metallized materials are lightweight, but durable. They will conform to any shape and may be crumpled for softer effect.

# 3808 Featherflex S/W	Lightly textured. Reversible Silver or White.
# 3812 Featherflex S/G	Lightly textured. Reversible Silver or Gold.
# 3813 Thin Mirror S	Silver mirror surface.
# 3814 Thin Mirror G	Gold mirror surface.

These metallized materials are specialized laminates that offer soft reflector quality as well as other features.

# 3809 Roscoscrim	A textured and perforated metallized reflector that offers a soft directional quality, particularly when mounted to white foamcore or showcard. Also useful as a neutral density window scrim (see page 10). Placed above crew and equipment, it offers shading from the heat of direct sunlight while permitting airflow.
# 3830 Spun Silver	A soft, silver foil bonded to a spun polyester base. The silver side is suitable for directed light, longer throws, or reflected skylight. The white side is useful for softer, wider coverage. It can be sewn and grommetted into large area reflectors.



Grips, Gaffers and other technicians concerned about the quality of the light often use more than one Rosco reflection material to get the exact result they want. In this situation, for example, the filmmaker covered one board with Roscoflex S for a soft reflection. But because a very slightly warmer tint was needed, Roscoflex G was affixed to a companion board.

European-style Color Correction, Diffusion, Reflection and Color Effects Filters

Rosco has been the recognized worldwide leader in filter technology for almost 100 years. Rosco E-Colour continues that tradition with a comprehensive collection of filters for those who are accustomed to the European-style color names and numbering system.

Each E-Colour filter is manufactured through a precisely controlled coating process utilizing the latest in dye and polymer technology. As a result, they equal or exceed the performance of competing European brands.

E-Colour filters are available in rolls 48 in. x 25 ft. (122cm x 7.62m), or sheets 21 in. x 24 in. (53cm x 61cm).

A QUICK REFERENCE GUIDE TO E-COLOUR CORRECTION FILTERS

NAME	DESCRIPTION	MIRED SHIFT	TRANS.	
To Increase Kelvin				
200	Double CTB	Tungsten to Daylight correction. 2800°K to 10,000°K.	-270	16% (-2.7s)
201	Full CTB	Tungsten to Daylight correction. 3200°K to 5700°K.	-137	34% (-1.6s)
281	Three-Quarter CTB	Tungsten to Daylight correction. 3200°K to 5000°K.	-112	46% (-1.1s)
202	Half CTB	Tungsten to Daylight correction. 3200°K to 4300°K.	-78	55% (-.9s)
203	Quarter CTB	Tungsten to Daylight correction. 3200°K to 3600°K.	-35	69% (-.5s)
218	Eighth CTB	Tungsten to Daylight correction. 3200°K to 3400°K.	-18	81% (-.3s)
To Decrease Kelvin				
204	Full CTO	Daylight to Tungsten correction. 6500°K to 3200°K.	+159	55% (-.9s)
285	Three-Quarter CTO	Daylight to Tungsten correction. 6500°K to 3500°K.	+132	61% (-.7s)
205	Half CTO	Daylight to Tungsten correction. 6500°K to 3800°K.	+109	71% (-.5s)
206	Quarter CTO	Daylight to Tungsten correction. 6500°K to 4600°K.	+64	79% (-.3s)
223	Eighth CTO	Daylight to Tungsten correction. 6500°K to 5600°K.	+26	85% (-.2s)
441	Full CTS	Daylight to Tungsten correction. 6500°K to 3200°K.	+160	57% (-.8s)
442	Half CTS	Daylight to Tungsten correction. 6500°K to 3800°K.	+109	71% (-.5s)
443	Quarter CTS	Daylight to Tungsten correction. 6500°K to 4600°K.	+64	80% (-.3s)
444	Eighth CTS	Daylight to Tungsten correction. 6500°K to 5300°K.	+26	83% (-.2s)
To Add Green				
244	Plus Green	CC30 Green when balancing to fluorescent/discharge lamps.	N/A	74% (-.4s)
245	Half Plus Green	CC15 Green when balancing to fluorescent/discharge lamps.	N/A	82% (-.3s)
246	Quarter Plus Green	CC075 Green when balancing to fluorescent/discharge lamps.	N/A	85% (-.2s)
278	Eighth Plus Green	CC035 Green when balancing to fluorescent/discharge lamps.	N/A	88% (-.2s)
To Remove Green				
247	Minus Green	CC30 Magenta for balancing fluorescent/discharge lamps.	N/A	59% (-.8s)
248	Half Minus Green	CC15 Magenta for balancing fluorescent/discharge lamps.	N/A	72% (-.5s)
249	Quarter Minus Green	CC075 Magenta for balancing fluorescent/discharge lamps.	N/A	82% (-.3s)
279	Eighth Minus Green	CC035 Magenta for balancing fluorescent/discharge lamps.	N/A	87% (-.2s)
Neutral Density				
298	.15 ND	Reduces light intensity 1/2 stop.	N/A	69% (-.5s)
209	.3 ND	Reduces light intensity 1 stop.	N/A	51% (-1.0s)
210	.6 ND	Reduces light intensity 2 stops.	N/A	24% (-2.1s)
211	.9 ND	Reduces light intensity 3 stops.	N/A	13% (-3.0s)
299	1.2 ND	Reduces light intensity 4 stops.	N/A	6% (-4.0s)
207	CTO + .3 ND	Daylight to Tungsten correction plus 1 stop ND.	+159	33% (-1.6s)
208	CTO + .6 ND	Daylight to Tungsten correction plus 2 stops ND.	+159	16% (-2.7s)
Arc Correction				
212	LCT Yellow	Reduces color temperature of yellow flame arcs.	+46	89% (-.2s)
213	WF Green	Reduces color temperature of white flame arcs.	N/A	89% (-.2s)
226	UV Filter	Absorbs excess UltraViolet from strobes, arcs and HMI.	+10	92% (-.1s)
236	HMI to Tungsten	Converts 6000°K HMI to Tungsten.	+150	58% (-.8s)
Fluorescent Correction				
219	Fluorescent Green	Converts Tungsten to Fluorescent.	N/A	32% (-1.6s)
241	Fluorescent 5700°K	Converts Tungsten to Cool White Fluorescent.	N/A	27% (-1.9s)
242	Fluorescent 4300°K	Converts Tungsten to White Fluorescent.	N/A	37% (-1.4s)
243	Fluorescent 3600°K	Converts Tungsten to Warm White Fluorescent.	N/A	46% (-1.1s)

E-COLOUR COLOR EFFECTS FILTERS

NAME	T%	x	y
002	Rose Pink	52% (-0.9s)	0.510 0.318
003	Lavender Tint	74% (-0.4s)	0.445 0.398
004	Med. Bastard Amber	61% (-0.7s)	0.503 0.395
007	Pale Yellow	89% (-0.2s)	0.467 0.426
008	Dark Salmon	37% (-1.4s)	0.586 0.379
009	Pale Amber Gold	70% (-0.5s)	0.498 0.418
010	Medium Yellow	84% (-0.3s)	0.514 0.468
013	Straw Tint	71% (-0.5s)	0.505 0.426
015	Deep Straw	61% (-0.7s)	0.559 0.436
017	Surprise Peach	19% (-2.4s)	0.555 0.397
019	Fire	17% (-2.6s)	0.655 0.341
020	Medium Amber	53% (-0.9s)	0.567 0.416
021	Gold Amber	37% (-1.4s)	0.609 0.387
022	Dark Amber	24% (-2.1s)	0.640 0.358
024	Scarlet	20% (-2.3s)	0.633 0.336
025	Sunset Red	27% (-1.9s)	0.617 0.365
026	Bright Red	7% (-3.8s)	0.685 0.312
027	Medium Red	3% (-5.1s)	0.688 0.304
029	Plasa Red	6% (-4.1s)	0.687 0.312
035	Light Pink	63% (-0.7s)	0.480 0.386
036	Medium Pink	46% (-1.1s)	0.511 0.363
039	Pink Carnation	60% (-0.7)	0.474 0.372
046	Dark Magenta	6% (-4.1s)	0.640 0.308
052	Light Lavender	38% (-1.4s)	0.412 0.337
058	Lavender	9% (-3.5s)	0.330 0.237
061	Mist Blue	63% (-0.7s)	0.406 0.395
063	Pale Blue	54% (-0.9s)	0.387 0.395
068	Sky Blue	13% (-3.0s)	0.177 0.249
071	To kyo Blue	1% (-6.7s)	0.150 0.062
075	Evening Blue	12% (-3.1s)	0.195 0.237
079	Just Blue	8% (-3.7s)	0.153 0.202
085	Deeper Blue	3% (-5.1s)	0.145 0.142
088	Lime Green	69% (-0.5s)	0.458 0.495
089	Moss Green	31% (-1.7s)	0.357 0.561
090	Dark YellowGreen	11% (-3.2s)	0.248 0.671
100	Spring Yellow	71% (-0.5s)	0.504 0.469
101	Yellow	80% (-0.3s)	0.527 0.461
102	Light Amber	75% (-0.4s)	0.520 0.444
103	Straw	82% (-0.3s)	0.480 0.419
104	Deep Amber	64% (-0.6s)	0.540 0.445
105	Orange	41% (-1.3s)	0.597 0.400
106	Primary Red	9% (-3.5s)	0.679 0.318
107	Light Rose	48% (-1.1s)	0.523 0.371
108	English Rose	68% (-0.6s)	0.536 0.399
109	Light Salmon	55% (-0.9s)	0.521 0.375
110	Middle Rose	47% (-1.1s)	0.496 0.367
111	Dark Pink	32% (-1.6s)	0.534 0.341
113	Magenta	11% (-3.2s)	0.657 0.308
115	Pea cock Blue	35% (-1.5s)	0.226 0.444
116	Medium Blue Green	17% (-2.6s)	0.167 0.448
117	Steel Blue	55% (-0.9s)	0.354 0.408
118	Light Blue	22% (-2.2s)	0.196 0.361
119	Dark Blue	3% (-5.1s)	0.135 0.152
120	Deep Blue	1% (-6.7s)	0.137 0.101
121	Leaf Green	64% (-0.6s)	0.421 0.527
122	Fern Green	51% (-1.0s)	0.422 0.458
124	Dark Green	30% (-1.7s)	0.284 0.587
126	Mauve	4% (-4.7s)	0.482 0.220
127	Smokey Pink	12% (-3.1s)	0.544 0.349
128	Bright Pink	14% (-2.8s)	0.575 0.287
130	Clear	NA	NA NA
131	Marine Blue	27% (-1.9s)	0.290 0.451
132	Medium Blue	8% (-3.7s)	0.148 0.232
134	Golden Amber	38% (-1.4s)	0.570 0.396
135	Deep Golden Amber	19% (-2.4s)	0.644 0.355
136	Pale Lavender	43% (-1.2s)	0.431 0.365
137	Special Lavender	26% (-2.0s)	0.373 0.337
138	Pale Green	80% (-0.3s)	0.444 0.463

NAME	T%	x	y
139	Primary Green	15% (-2.7s)	0.271 0.679
140	Summer Blue	35% (-1.5s)	0.304 0.393
141	Bright Blue	19% (-2.4s)	0.161 0.326
142	Pale Violet	20% (-2.3s)	0.316 0.300
143	Pale Navy Blue	16% (-2.7s)	0.261 0.359
144	No Color Blue	32% (-1.6s)	0.261 0.386
147	Apricot	53% (-0.9s)	0.547 0.402
148	Bright Rose	14% (-2.8s)	0.608 0.319
151	Gold Tint	69% (-0.5s)	0.501 0.395
152	Pale Gold	71% (-0.5s)	0.494 0.406
153	Pale Salmon	65% (-0.6s)	0.494 0.385
154	Pale Rose	73% (-0.5s)	0.487 0.397
156	Chocolate	26% (-2.0s)	0.511 0.411
157	Pink	36% (-1.5s)	0.576 0.348
158	Deep Orange	30% (-1.7s)	0.613 0.386
159	No Color Straw	89% (-0.2s)	0.458 0.416
161	Slate Blue	25% (-2.0s)	0.258 0.333
162	Bastard Amber	78% (-0.4s)	0.488 0.408
164	Flame Red	18% (-2.5s)	0.655 0.338
165	Daylight Blue	20% (-2.3s)	0.225 0.310
166	Pale Red	25% (-2.0s)	0.604 0.341
169	Lilac Tint	65% (-0.6s)	0.436 0.385
170	Deep Lavender	26% (-2.0s)	0.418 0.330
172	Lagoon Blue	17% (-2.6s)	0.173 0.381
174	Dark Steel Blue	30% (-1.7s)	0.319 0.355
176	Loving Amber	50% (-1.0s)	0.537 0.377
179	Chrome Orange	54% (-0.9s)	0.576 0.419
180	Dark Lavender	7% (-3.8s)	0.279 0.204
181	Congo Blue	1% (-6.7s)	0.180 0.098
182	Light Red	11% (-3.2s)	0.675 0.322
183	Moonlight Blue	19% (-2.4s)	0.164 0.344
184	Cosmetic Peach	57% (-0.8s)	0.468 0.412
185	Cosmetic Burgundy	52% (-0.9s)	0.470 0.408
186	Cosmetic Silver Rose	51% (-1.0s)	0.470 0.402
187	Cosmetic Rouge	54% (-0.9s)	0.482 0.402
188	Cosmetic Highlight	56% (-0.8s)	0.471 0.410
189	Cosmetic Silver Moss	61% (-0.7s)	0.470 0.422
190	Cosmetic Emerald	60% (-0.7s)	0.452 0.417
191	Cosmetic Aqua Blue	53% (-0.9s)	0.447 0.415
192	Plush Pink	35% (-1.5s)	0.539 0.339
193	Rosy Amber	36% (-1.5s)	0.570 0.356
194	Surprise Pink	22% (-2.2s)	0.368 0.323
195	Zenith Blue	3% (-5.1s)	0.144 0.141
196	True Blue	27% (-1.9s)	0.266 0.347
197	Alice Blue	10% (-3.3s)	0.228 0.262
198	Palace Blue	2% (-5.7s)	0.192 0.165
322	Soft Green	37% (-1.4s)	0.292 0.494
323	Jade	31% (-1.7s)	0.233 0.517
325	Mallard Green	7% (-3.8s)	0.158 0.557
327	Forest Green	4% (-4.7s)	0.226 0.597
328	Follies Pink	20% (-2.3s)	0.543 0.290
332	Special Rose Pink	11% (-3.2s)	0.619 0.288
341	Plum	19% (-2.4s)	0.479 0.359
343	Special Med. Lavender	6% (-4.1s)	0.278 0.184
344	Violet	20% (-2.3s)	0.323 0.295
345	Fuschia Pink	14% (-2.8s)	0.421 0.289
352	Glacier Blue	23% (-2.1s)	0.230 0.347
353	Lighter Blue	41% (-1.3s)	0.275 0.396
354	Special Steel Blue	39% (-1.4s)	0.238 0.427
363	Special Medium Blue	4% (-4.7s)	0.142 0.130
366	Cornflower	18% (-2.5s)	0.299 0.335

Note: x, y chromaticity coordinates are measured to Source A (tungsten).

E-COLOUR DIFFUSION MATERIALS

Spun Series - Feathers the beam edge and smooths the beam field. Beam shape is maintained with minimal beam spread. Slight contrast reduction. Not generally recommended on HMI's since the texture of the filter may be reproduced in the beam.

- #214 Full Tough Spun
- #215 Half Tough Spun
- #229 Quarter Tough Spun

White Frost and Hanover Frost Series - Slight diffusion properties while still maintaining a discernible beam center. Minor contrast reduction.

- #253 Hanover Frost
- #256 Half Hanover Frost
- #257 Quarter Hanover Frost
- #220 White Frost
- #221 Blue Frost (contains Eight CTB #218)

Atlantic Frost Series - A general purpose group that offers moderate-to-medium diffusion properties. Moderate beam spread. Moderate contrast reduction.

- #480 Full Atlantic Frost
- #481 Half Atlantic Frost
- #482 Quarter Atlantic Frost

216 White Diffusion Series - A popular series that offers moderate-to-dense diffusion properties. Medium-to-wide beam spread with noticeable contrast reduction.

- #216 White Diffusion
- #416 Three-Quarter White Diffusion
- #250 Half White Diffusion
- #450 Three-Eighths White Diffusion
- #251 Quarter White Diffusion
- #252 Eighth White Diffusion
- #452 Sixteenth White Diffusion

Heavy Frost - A dense diffuser with wide beam spread creating an even field of soft, shadowless light. Noticeable contrast reduction.

- #129 Heavy Frost

Special Diffusion Materials -

- #228 Brushed Silk - Directional diffuser. Spreads the beam horizontally, vertically or diagonally.
- #224 Daylight Blue Frost - 216 White Diffusion combined with CTB #201.
- #225 Neutral Density Frost - 216 White Diffusion combined with .6 Neutral Density #210.

E-COLOUR REFLECTION MATERIALS

- #270 Scrim - Perforated soft silver reflector. Also useful as a neutral density window scrim.
- #271 Mirror Silver - Hard Silver reflector.
- #272 Soft Gold Reflector - Gold reflector with a soft pebble surface.
- #273 Soft Silver Reflector - Silver reflector with a soft pebble surface.



Polarizing Filter

Rosco Polarizing Filter is a neutral-gray linear polarizing filter designed for use on lights. It is commonly used in still photography to reduce glare from smooth reflective surfaces such as glass, water, glossy paper, artwork, and certain metallic objects. This lighting filter does not replace a camera lens polarizer, but is used in conjunction with it to produce a "cross polarization" effect. This technique requires the camera operator to affix the Rosco Polarizing Filter in front of the lights so that their axes are in the same direction. The camera lens polarizer is then rotated until the glare diminishes or disappears.

Rosco Polarizing Filters are available in sheets 19 in. x 20 in. (48cm x 50cm), or rolls 19 in. x 5 ft. (48cm x 150cm). Because of their acetate base, care should be taken when used on hot lights.

UV Filter

Rosco UV Filter is a slightly warm filter that absorbs 90% of the near-ultraviolet spectrum. It is widely used by photographers to absorb the excess ultraviolet output of strobes, HMI and other arc-discharge sources which can cause unwanted color shift or fluorescing of dyes and textile whiteners.

Rosco UV Filter is available in sheets 20 in. x 24 in. (50cm x 61cm), rolls 24 in. x 50 ft. (61cm x 15.2 m), rolls 48 in. x 25 ft. (122cm x 7.62m), or in 48 in. (122cm) sleeves designed to fit T-8 or T-12 fluorescent lamps.

Thermashield

Rosco Thermashield is an optical grade polyester film finished on one side with a proprietary multi-layer coating. This coating reflects most of the damaging infrared heat energy emitted by film and television fixtures while allowing transmission of the visible light.

Rosco Thermashield is available in sheets 12 in. x 12 in. (30cm x 30cm), sheets 20 in. x 24 in. (50cm x 61cm), or rolls 48 in. x 4 ft. (122cm x 122cm).

Heat Shield

Rosco Heat Shield is a colorless engineered polymer with very high heat resistance. When placed between the fixture and a color filter, Heat Shield provides a physical barrier to convected heat thereby extending the life of the filter. For best efficiency a minimum 1 inch (25mm) air space should be maintained between the Heat Shield and the color filter.

Rosco Heat Shield is available in sheets 20 in. x 24 in. (50cm x 61cm), rolls 24 in. x 50 ft. (61cm x 15.2m), or rolls 48 in. x 25 ft. (122cm x 7.62m).

Cinedichro

Dichroic Glass Color Correction

Rosco Cinedichro filters are extremely durable, heat resistant dichroic glass filters. Each Cinedichro filter has been precisely engineered to provide accurate color correction for either daylight or tungsten sources. Because of their extreme heat resistance, Cinedichro filters can be used on most high wattage fixtures, even 6K HMI Pars. Available in sizes up to a maximum diameter of 13.5 in. (343mm).

CTB

#43202 Cinedichro Full Blue CTB

#43204 Cinedichro Half Blue CTB

#43208 Cinedichro Quarter Blue CTB

#43026 Cinedichro White Diffusion

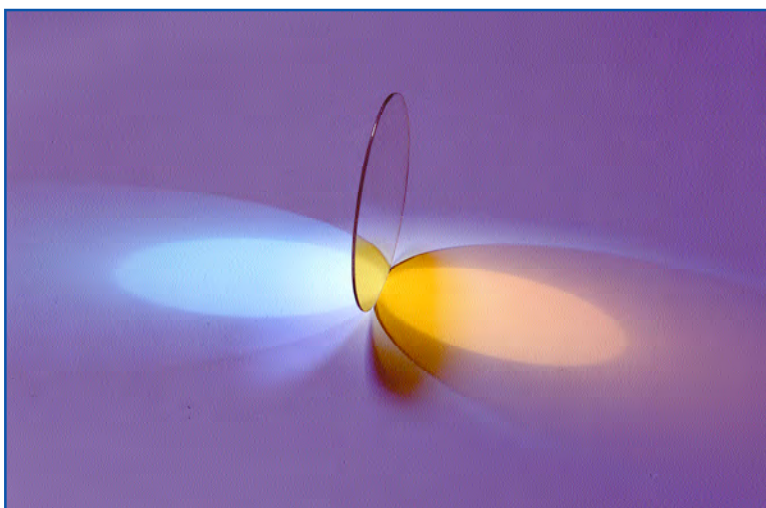
CTO

#43407 Cinedichro Full CTO

#43408 Cinedichro Half CTO

#43409 Cinedichro Quarter CTO

#38000 Cinedichro IR/UV Filter



Cinefoil

Matte Black Aluminum Foil

Rosco Matte Black Cinefoil is a specially coated matte black aluminum foil that is totally opaque and stable under high heat conditions. It is ideal for masking light leaks or eliminating unwanted reflections. It can be quickly formed to create barn doors, flags or unusual configurations. Lightweight yet durable, Cinefoil can be positioned in place with tape, staples or adhesives.

Rosco Cinefoil is available in a handy dispenser box in two sizes, 12 in. x 50 ft. (30cm x 15.2m), or 24 in. x 25 ft. (61cm x 7.62m). It is also packaged as a wide-width roll, in a reusable sleeve, 48 in. x 25 ft. (122cm x 7.62m).

PhotoFoil

Cinefoil is now available in convenient shorter lengths for still photographers, videographers and students. Packaged in protective polytube. PhotoFoil offers the same light control properties at an economical price. Two sizes, 12 in. x 10 ft. (30 cm x 3 m) and 24 in. x 10 ft. (61 cm x 3 m).



Lens Cleaner

The professional's choice for over 50 years. Especially designed for cleaning lenses, mirrors, reflectors, glass and dichroic filters and other delicate optics. Easy to use and fast drying, Rosco Lens Cleaner quickly removes dirt, residue, smudges, and fingerprints. Free of ammonia, detergents and glycerine.

Available in a 2 ounce drip bottle for smaller applications and a new 8 ounce spray bottle which is especially suited for lighting crews and rental shops. Useful for cleaning lenses and reflectors in moving lights as well as standard lighting fixtures.

Lens Tissue

Premium, lightweight, disposable micro-fiber tissue for cleaning lenses, filters and other delicate optics. Lintless and static-free, Rosco Lens Tissue contains no abrasives or silicone. Best when used together with Rosco Lens Cleaner.

Handy pocket-sized 4" x 6" booklet, containing 100 sheets.

Photo Kits

Rosco offers a number of kits to allow users to either familiarize themselves with selected products, or to provide a handy compliment of filters for location lighting kits. The 10 in. x 12 in. (25cm x 30cm) kits are packaged in a handy reusable pouch, while the 20 in. x 24 in. (50cm x 60cm) kits are supplied in a sturdy reusable storage tube.

Color Effects Kit

The fifteen color effects filters in this kit are the most popular of the 300-plus colors that Rosco produces for theatre, film and television. The selection includes ambers, blues, lavender, straw, pale gold, pale pink, red, magenta and green. These filters are useful for product photography, backgrounds or enhancing skin tones.

Color Correction Kit

This kit permits the color correction of virtually all mixed-light sources found on location. It includes a range of blue and amber color correction filters along with a selection of green and magenta color compensating filters.

Diffusion Kit

Diffusion materials help modify the harsh character of a light source by softening the beam and the resulting shadows. The fifteen materials included in this kit offer a range of diffusion effects from slight to dense.

Cinegel Sampler Kit

This is an all-purpose selection of the most popular Cinegel products. There are fifteen light control materials including diffusion, reflection, color effects filters and color correction filters.



RoscoVIEW

Variable Intensity and Exposure on Windows

RoscoVIEW is a two-part system consisting of wide width polarizer window film and a matching optical glass polarizer camera filter. When utilized together, you are able to instantly control 100% of exterior brightness as seen through windows without affecting the lighting and exposure within the studio or set. By rotating the RoscoVIEW camera filter, you are able to change the degree of cross polarization occurring on the window where RoscoVIEW window film is applied. It is no longer necessary to constantly change out various ND filters or keep many different types of hard gels on stand by.

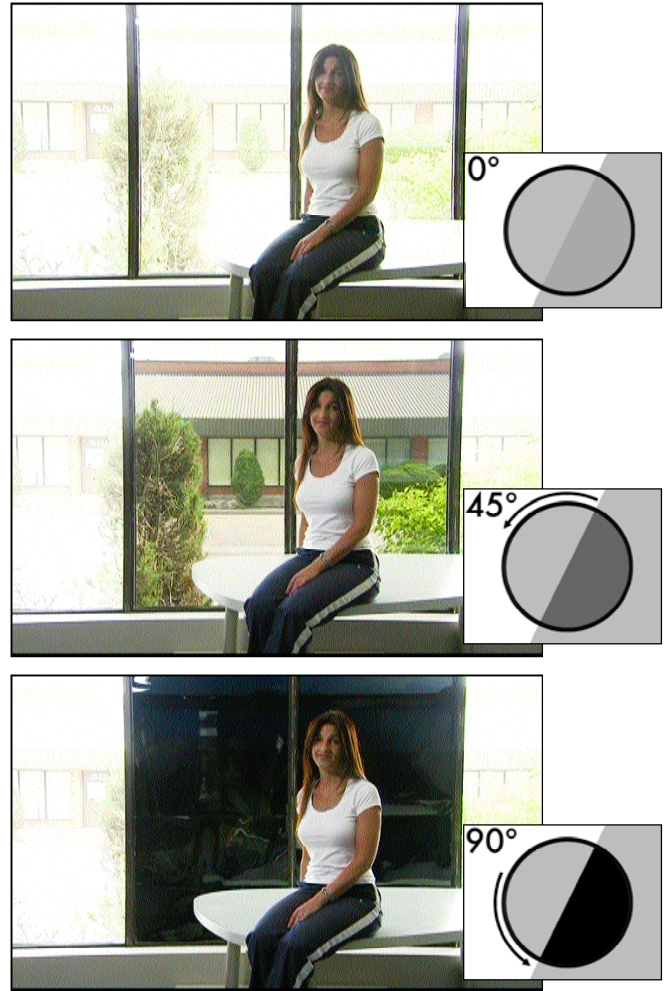
- Reduce studio downtime, no more change out of filters, increase shooting time
- Great for areas where it is difficult to reapply filters regularly
- More economical for larger window surfaces

No. 101 07400 5609
No. 101 07400 5601

Window Film, 56" x 9"
Window Film, 56" x linear footage

No. 101 07410 0404
No. 101 07410 0405
No. 101 07410 0138
No. 101 07410 6666

Camera Filter, 4" x 4"
Camera Filter, 4" x 5.65"
Camera Filter, 138mm
Camera Filter, 6.6" x 6.6"

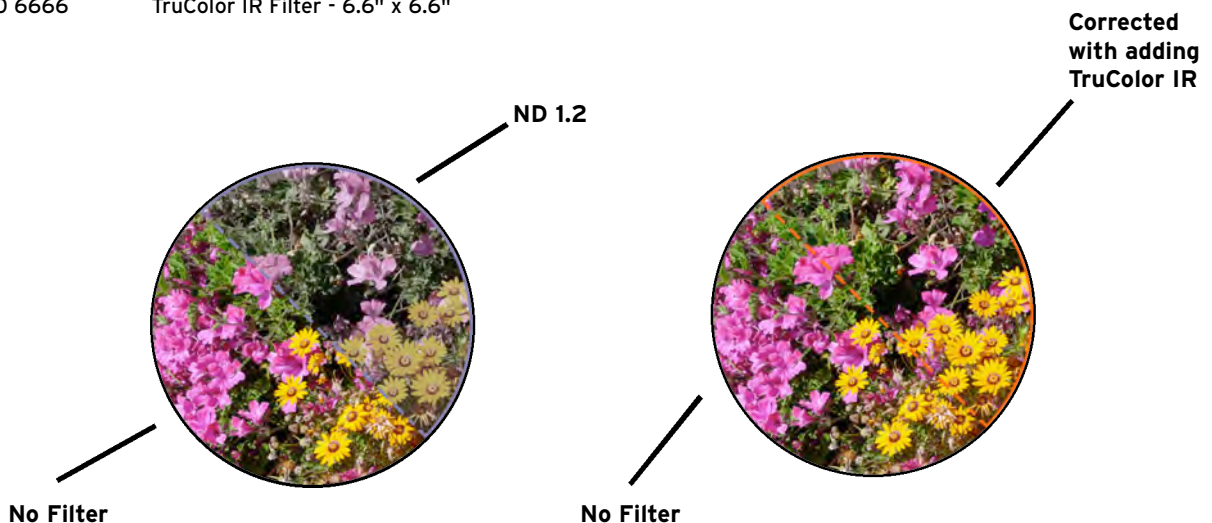


TruColor IR

In some digital and HD video cameras the use of ND camera filters can excessively desaturate the color balance of the shot. Rosco's TruColor IR camera filter restores the proper color saturation by balancing the visible and infrared light, allowing the camera sensors to properly render color in the finished composition. Available in 4 standard sizes. Custom sizes available upon request.

No. 120 48010 0404
No. 120 48010 4565
No. 120 48010 5656
No. 120 48010 6666

TruColor IR Filter - 4" x 4"
TruColor IR Filter - 4" x 5.65"
TruColor IR Filter - 5.65" x 5.65"
TruColor IR Filter - 6.6" x 6.6"





www.rosco.com

52 Harbor View Avenue, Stamford, CT 06902
(203)708-8900 • 1(800)ROSCO NY • Fax: (203)708-8919

1265 Los Angeles Street, Glendale, CA 91204
(818)543-6700 • 1(800)ROSCO LA • Fax: (818)662-9470

1241 Denison St. #44, Markham, Ontario L3R 4B4
(905)475-1400 • 1(888)ROSCO TO • Fax: (905)475-3351

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