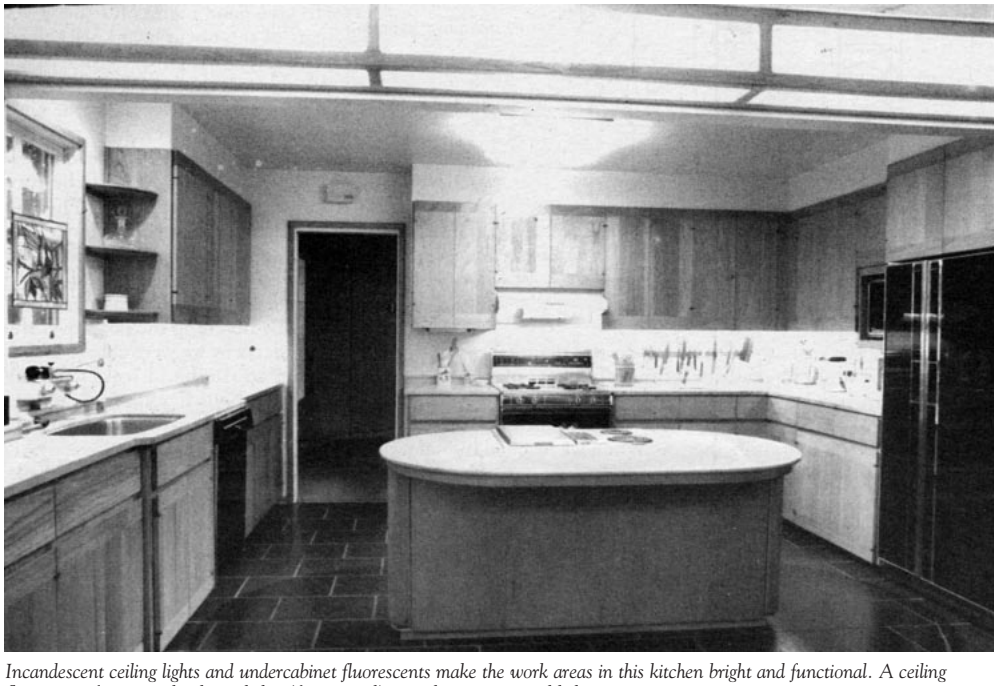
A Practical Guide To Kitchen Lighting

by Paul Turpin

The nuts and bolts of placing kitchen lights and specifying fixtures



Incandescent ceiling lights and undercabinet fluorescents make the work areas in this kitchen bright and functional. A ceiling fluorescent fixture and valance lights (foreground) provide even, general lighting.

Kitchens are the single most challenging rooms to light. No other room serves so many functions — from basic food preparation to evening entertaining. Often we don't know if a kitchen lighting scheme will work until the end of a project, yet all our efforts hinge on this last crucial step. Good lighting will show off your work, while dismal lighting can sour the customer's appreciation of an otherwise nice kitchen.

Most of the up-front work of lighting a kitchen is knowing what lamps to spec and where to place them. This is usually more complicated than in other rooms, which are used for only one type of activity. In a kitchen you need three different kinds of lighting — general lighting to see your way around, task lighting at work stations, and accent lighting to show off architectural details and set a "mood."

To accomplish all of these lighting effects, I combine the output of different lights. First, I look for a combination of fixtures that, all together, will give maximum illumination for general lighting and, subdivided, will give different levels of task and mood lighting. Second, I decide on the combination of switches that will best control the fixtures. Dimmers are especially useful for controlling a single kitchen fixture with several functions. A bright ceiling fixture used for general lighting, or a bright floodlight for task lighting, can become accent lighting when dimmed to a soft glow.

In this article I will explain some of the guidelines I use to select and place fixtures, and then I will show how I have applied these principles in two cases (see "Kitchen Lighting Case Studies").

Lighting Rule of Thumb

How much light should you use overall? A commercial contractor might use complex IES (Illuminating Engineering Society) formulas. But these calculations are cumbersome for a residential kitchen. I use a simple rule of thumb based on the assumption that most kitchens have about 8- to 10-foot-high ceilings, are roughly square, and are somewhere between 100 and 200 square feet.

I've found over the years that in a kitchen, you need two or more watts per square foot as a base figure. Because this rule is based on wattage (power input), rather than lumens (light output), you have to account for the difference between incandescent and fluorescent lights. Fluorescent lights are about two-and-a-half times more efficient than incandescents. This means you'll need roughly two F40 fluorescent tubes (80 fluorescent watts total) to equal two 100-watt incandescent bulbs. By my rule of thumb, this is enough light for a 10x10 kitchen.

The amount of light is only a starting point. Different fixtures put out different amounts of light, regardless of the bulb wattages. Also, different room configurations may require different lighting arrangements to sufficiently light the space. Depending on how much light is indirect and how big the room is, I may boost my base figure to three or even four watts per square foot. I like to spread out the light sources, too. It is better to have two 100-watt lamps than one 200-watt lamp. The more evenly you spread the light, the more you'll diminish glare and minimize stark shadows.

General Fixture Requirements

A lighting fixture has to pass three tests before I'll use it:

First, the customer has to like the fixture's appearance. I may make an extra effort to sell a fixture that I think contributes to a design, but if the customer just plain thinks it's ugly, I'll find a different fixture. I start by showing pictures in catalogs and recommend that

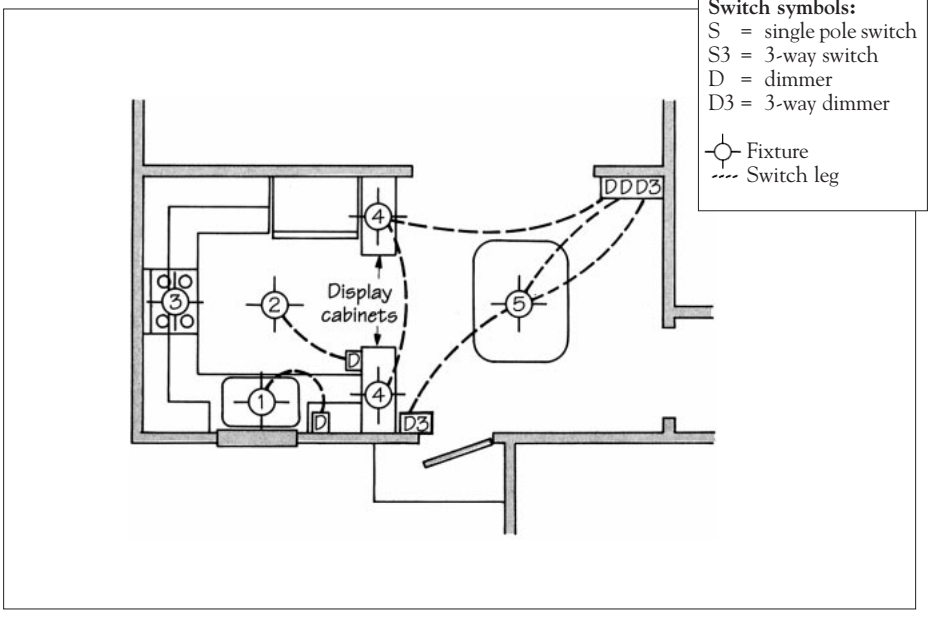
Kitchen Lighting Case Studies

Case Study #1

The floor plan shows a partially open kitchen with a distinct separation between kitchen and dining areas, defined by the display cabinets that form one wall of the dining room. Here I include the dining room lighting as part of the kitchen lighting solution to demonstrate that lighting can be used to obscure, as well as to illuminate.

The kitchen area is very small and shows my preference for minimal kitchen lighting. I used two surface-mounted fixtures, providing a combination of strong direct lighting and good reflectance from wall, cabinet, and ceiling surfaces. This combination produces strong overall light and minimizes shadows. By controlling these fixtures with dimmers, multiple light levels from these two sources can achieve almost any desired balance.

The dining area lighting is designed to focus attention on the table and to distract attention from the kitchen during mealtime. The light in the display cabinets makes a "foreground" of brightness that makes it difficult to see into the darkened kitchen. The chandelier has a downlight that illuminates the tabletop plus five 60-watt candelabra bulbs, which can be separately adjusted for everything from a soft glow to 300 watts of brilliance.

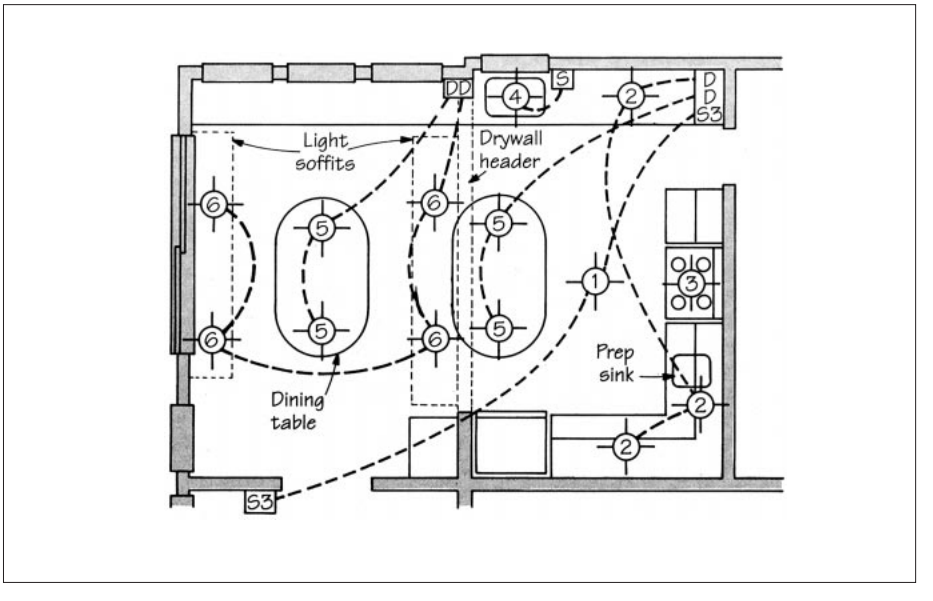


1. ***Sink light:*** *Task lighting and indirect general lighting from a surface-mounted 100-watt incandescent on a Leviton 6621 slide dimmer.*
2. ***Ceiling fixture:*** *General lighting from a surface-mounted 200-watt 1930s fixture (salvaged from a previous job) on a Leviton 6621 slide dimmer.*
3. ***Range hood light:*** *Standard 40-watt incandescent bulb, which helps reduce shadows.*
4. ***Display case lighting:*** *Accent lighting placed inside glass-front dining room cabinets. Each side has two T-10 40-watt incandescent bulbs. Both sides are on one Leviton 6621 dimmer.*
5. ***Suspended chandelier:*** *Task lighting for dining table from 50-watt R-30 downlight on a Leviton 6606 touch dimmer. General lighting from five 60-watt candelabra bulbs on a Leviton 6607 three-way dimmer.*

Case Study #2

This kitchen has two main areas, with a drywalled header marking the separation between cooking and dining areas. The kitchen area has a central ceiling fixture for general lighting. A recessed light above the main sink, track lights above the island cabinet, and dimmable fluorescents under the wall cabinets all perform as task or accent lighting, depending on which fixtures are operating at which level, and all add indirectly to the overall illumination. The curved island cabinet was conceived as a "stage setting" for flamboyant, Chinese-style stir-frying, which is one of the customers' favorite forms of entertaining. This is lit by two Capsylite/PAR 75-watt NFLs (see lead photo).

The dining area has dimmable fluorescents that live behind valances and wash the ceiling with indirect general lighting. Track lights are focused on the table. These consist of one Capsylite/PAR 75-watt NSP and one Capsylite/PAR 75-watt NFL. The NSP throws a bright "hot spot" on the table's centerpiece, while the broader beam of the NFL spreads just enough to illuminate all the place settings, stopping short of shining directly in anyone's eyes. This kitchen/dining area is completely open and relies on lighting to distract from work areas during mealtimes.



1. ***Kitchen ceiling fixture:*** *General lighting from a 2'x2' "floating lens" fluorescent fixture with a 30-watt FB40/6 U-bent tube (3000°K) on a three-way switch.*
2. ***Undercabinet lighting:*** *Task and accent lighting from unshielded fluorescents. Each fixture has a dimming ballast (all three ballasts are controlled by one dimmer switch) and a pair of 48" F40WW fluorescent tubes (3000°K) protected by the cabinet valance and safety sleeves.*
3. ***Range hood light:*** *Standard 40-watt incandescent bulb, which helps reduce shadows.*
4. ***Sink light:*** *Task and accent lighting from a recessed 60-watt incandescent on a single-pole switch.*
5. ***Track lights:*** *Task and accent lighting at island from two 75-watt NFLs (narrow floods). Task lighting at table from one 75-watt NFL and accent lighting from one 75-watt NSP (narrow spot).*
6. ***Dining room ceiling fixtures:*** *Indirect general lighting from unshielded fluorescents. Each fixture has a dimming ballast controlled by a dimmer switch, and a pair of 48" F40WW T-12 tubes.*

customers go to lighting stores and showrooms. I like to do my homework first, so I can answer any questions about the catalog specs (see "Reading a Lamp Catalog," below). Occasionally, I will model a fixture by bringing one to the customer's home. I have an extension cord I've made up that has a two-gang box controlled by a dimmer switch. This works to sample fixtures and demonstrate different kinds of bulbs. But you can't beat an actual working kitchen for showing off what certain fixtures can do, so I always urge customers to look at my previous jobs.

Second, a fixture has to have adequate light output. A great looking fixture with a maximum capacity of 60 watts won't work as the main light source in a large kitchen. All fixtures have a maximum wattage rating. Manufacturers may offer several different versions of one fixture shape, so you should know exactly what you'll need for the job. If you buy the 60-watt version when the situation calls for the 250-watt fixture, the customer is liable to be unhappy with the lighting. Or worse, he may put in a higher watt bulb and create a fire risk.

Finally, a fixture has to fit the specific lighting task in its given location. There are four basic locations for fixtures in a kitchen: The ceiling is for task and general lighting; the wall (above the sink, for example) is for task and general lighting; the underside of wall cabinets and stove hoods is for task, accent, and indirect general lighting; and the top of wall cabinets is for general and accent lighting.

I select the brightest fixtures for the ceiling. Other locations can also take bright fixtures, which serve as task lighting first and supplemental general lighting second. However, the most effective lighting schemes combine diffuse and direct lighting.

Diffuse Vs. Direct Light

Diffuse lighting is evenly distributed and relatively glare-free. Direct lighting provides maximum brightness, but you get shadows and have to be careful to avoid glare. By combining the two, you can soften shadows and reduce glare. Here are some guidelines for combining diffuse and direct light for each type of lighting in a kitchen.

General lighting. For general lighting I select at least one fixture, usually the main ceiling fixture, that casts some light on the ceiling as well as on the countertops and floor. That way I get a combination of diffuse and direct light from that one fixture — diffuse light bounces off the ceiling and cabinets and direct light shines directly into the room. But I also use some type of translucent diffusing enclosure on the central fixture to guard against glare. For fluorescent fixtures I use a white acrylic rather than the usual clear prismatic lens, and a white acrylic or clouded glass shade for incandescents.

I avoid using recessed or track lights for general lighting in a kitchen because they tend to leave the ceiling in shadow. This reduces the amount of reflectance in the room, which is needed to reduce glare. You also get very strong contrasts (bright light and deep shadow) at the work surfaces, which tend to dazzle the eye and make it difficult to see clearly. This reduces the lighting efficiency, so that you need even more watts per square foot. Surface-mounted fluorescents housed in fixtures with solid sides will also create a shadowed ceiling and should be avoided.

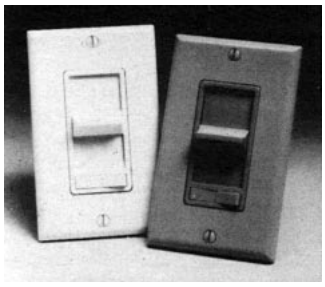


Figure 1. *The author likes Leviton Decora Slide-Dimmers, such as the one shown above, for lighting control. A single fixture on a dimmer can function as general lighting at full power, or as accent lighting when dimmed.*

However, in cases where the client absolutely wants recessed fixtures for general lighting, I use either a "specular aluminized reflector trim" or a "Fresnel lens" over them. These deliver the widest beam-spread. Space the lights 4 to 6 feet on-center for down lights, and 30 inches on-

Reading a Lamp Catalog

Lamp type:
F = fluorescent
40 = 40 watts
WW = warm white

Universal ID number

Manufacturer's description

Bulb type:
T = tubular
12 = 12/8" or 1 1/2" diameter

Color temperature (CT):
The color of the light itself when it is turned on

Watts	Lamp Type	NAED Number	Description	Bulb	Base	Rated Avg. Life (Hrs.)	Approx. Initial Lumens	Nominal Length	Kelvin Color Temp.	Color Rend. Index	Stock No.	List	Each
			PREHEAT RAPID START LAMPS										
40	F40CW	301879	Cool White	T12	MED.BP	20000	3150	48"	4100°	67	3V478	$2.39	$1.77
40	F40WW	301994	Warm White	T12	MED.BP	20000	3200	48"	3000°	63	3V327	$3.16	$2.53
40	F40GO	396358	Gold	T12	MED.BP	20000	2400	48"	N/A	N/A	4V635	$10.98	$9.88
40	F40D	301945	Daylight	T12	MED.BP	20000	2600	48"	6500°	79	3V178	$3.63	$3.27
40	F40/C50	302034	Colortone 50	T12	MED.BP	20000	2200	48"	5000°	92	3V524	$6.14	$5.44
40	F40W	301978	White	T12	MED.BP	20000	3200	78"	3500°	58	4V568	$3.95	$3.56
			PREHEAT RAPID START EXTENDED SERVICE LAMPS										
40	F40T10/CW/99	250092	Cool White Ext. Serv.	T10	MED.BP	24000	3200	48"	4100°	67	4V514	$5.66	$5.09
40	F40T10/WW/99	250704	Warm White Ext. Serv.	T10	MED.BP	24000	3250	48"	3000°	53	4V515	$6.28	$5.65
			RAPID START T-12 FLUORESCENT LAMPS										
30	F30T12/WW/RS	313742	Warm White	T12	MED.BP	18000	2370	36"	3000°	53	2V770	$7.33	$6.50
30	F30T12/D/RS	313684	Daylight	T12	MED.BP	18000	1950	36"	6500°	79	4V088	$7.33	$6.60
30	F30T12/CW/RS	313320	Cool White	T12	MED.BP	18000	2300	36"	4100°	67	2V897	$5.30	$4.24

W.W. Grainger

Base type:
Medium bi-pin

Lumens:
The approximate light output of the lamp when new. The lumens will degrade over time. Use this number as a relative guide to compare brightness between lamp models.

Color rendition index (CRI):
How true the color of an object looks in the light cast from the lamp. Look at both CT and CRI to find which lamp will give better color.

center and 30 inches away from the wall for wall-washers.

Task lighting. Once I've got the central fixture putting out reflected light, I can then add floodlights, either in track lights or recessed fixtures, for task lighting. I like track lights for their flexibility. If the customers decide they want more lights or more angles, they can easily add more lampholders and even more track after the painting and finishing is done. (Here's a tip on making tracks look straight in spite of an undulating ceiling: Make a few small blocks of wood 1/2 inch thick by the width of the track, and use these to fur the track away from the ceiling 1/2 inch. The effect is attractive and the track stays straight.)

Lighting countertops with fixtures below the wall cabinets is a good way to combine very bright task lighting and, with a dimmer switch, nice mood lighting. Keep in mind that most fixtures will need a valance to hide the glare of the tube or bulb, and adding this to existing cabinets can squeeze the available space between the counter and wall cabinets. Also, if you use unshielded fluorescent tubes, use safety sleeves over the tubes to reduce the chance of breaking one. These sleeves are required in commercial and industrial kitchens because the innards of fluorescent tubes are toxic. In addition, fluorescent fixtures mounted on wood cabinets have to be rated for contact with combustible surfaces.

Accent lighting. Accent lighting is used to accentuate architectural details (such as spotlighting an island centerpiece) or to achieve a dramatic effect (such as spreading a faint glow of indirect light on ceilings or countertops). Accent lighting can be done with conventional fixtures, but the key to successful accenting is in having flexible controls that can blend the lights from different fixtures for a variety of effects.

Controls

Most of the kitchens I remodel are central multipurpose rooms that need switches in more than one location. I am a believer in dimmer switches for good looks, practicality, and energy savings.

My favorite dimmer switch is a Leviton *Decora Slide-Dimmer* switch (Leviton Manufacturing Co., 59-25 Little Neck Pkwy., Little Neck, NY 11362; 800-323-8920). The basic model — the 6621 Single-Pole Slide Dimmer — can be used with incandescent lights (see Figure 1). You can also get fluorescent dimmers, fan speed controls, low-voltage dimmers, and three-way versions in the same product line. These are limited to a 600-watt load, which has to be reduced when ganged with other wiring devices (500 watts with one extra, 400 watts with two or more). Lightolier Controls (100 Lighting Way, Secaucus, NJ 07096; 800/526-2731) makes a similar line of dimmers, including one model that can control up to 1000 watts.

Keep in mind that standard incandescent bulbs yellow when dimmed, so you might want to choose bright white walls and ceilings that are washed by light.

As a simple energy-saving feature, I like to divide the lighting load among several controls. Rather than have one dimmer or switch control 300 watts, I use three switches to control 100 watts each. This way you only burn the full 300 watts when you need maximum brightness. If the customer is agreeable and the fixtures allow, I also make the first switch position a lower-wattage choice, so intermittent nighttime use doesn't burn the costlier lights.

Here in California, kitchen lighting is regulated by the state energy code, known as Title 24. The main light in a kitchen must put out at least 55 lumens per watt. Usually each municipality has its own definition of the "main" fixture. For some building inspectors this means the one controlled by the first switch position; others call it the largest ceiling fixture. But regardless of how that's settled, to meet the performance criteria, the fixture must be fluorescent.

Fluorescents

Most of the research on fluorescents has been done for the sake of the commercial and industrial worlds, where cost efficiency and energy savings mean so much more. But residential fluorescent lighting technology continues to improve, as well. The high lumens-per-watt efficiency of fluorescents is now being complemented by a variety of *color temperatures* and *color rendition indexes* (CRI), which are more compatible with traditional residential color and lighting schemes (see "Measuring the Color of a Light," above).

There are still some drawbacks to fluorescents: Standard-ballast tubes flicker when powered by 60 Mghz household current. Electronic ballasts can reduce this, while also providing better energy efficiency and quieter operation. Electronic ballasts are becoming more and more common because they are cheaper to run. They are now cheaper to buy, as well, and are longer-lived (the life expectancy is now very close to the 5- to 10-year life of a standard ballast). Keep in mind that most fluorescent lights can be dimmed, but you must use special dimming ballasts and dimmer switches. These end up costing about three times as much as a dimmer for an incandescent light.

Compact fluorescents have made remarkable strides in recent years. They are designed to replace incandescent bulbs and can provide outstanding energy savings. A 13-watt compact fluorescent gives out about as much light as a 75-watt incandescent, even in a recessed fixture (always use a reflector trim with a compact fluorescent in a recessed fixture). Compact fluorescents are now available with color temperatures very similar to incandescents, as well. Their CRI, however, is not quite as good. In addition, compact fluorescents blink a couple times before they come on, and the shape doesn't always fit in a conventional fixture.

Low-Voltage And Halogen Lamps

I usually use low-voltage lamps in a kitchen as a direct spot, and flood lighting for task and mood lighting. Fixtures are either recessed or surface-mounted (including track-style) and are generally smaller and less obtrusive than standard-voltage fixtures.

Low-voltage fixtures and bulbs are more expensive than standard lighting and require a transformer to lower the voltage of the incoming power. But low-voltage lamps are cheaper to burn and throw off very little waste heat. With standard MR-16 lamps, they give off a crisp, bright, very "white" light with excellent color rendition.

High-voltage halogen bulbs come very close in lighting quality to low-voltage equivalents. I often use Capsylite/PARs (PAR stands for parabolic anodized reflector, which describes the bulb shape) inside cabinets with glass doors and under cabinets for task lighting in place of more expensive MR-16 low-voltage lamps (see Figure 2). I typically use Designer 16 bulbs from GTE/Sylvania (GTE Products Corp., 416 East Washington St., Winchester, KY 40391; 800-255-5042). These halogen bulbs are available in 55- and 75-watt NFL (narrow flood) and NSP (narrow spot) models. However, if fixture size or waste heat is an issue, you'll have to stick with low-voltage lamps. ■

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Figure 2. *In place of more expensive low-voltage lamps, the author often uses Capsylite/PAR halogen bulbs for task lighting beneath wall cabinets. These bulbs fit standard fixtures and are known for giving off very "white," bright light with excellent color rendition.*

Measuring the Color Of A Light

In a kitchen where several different kinds of lamps — incandescent, fluorescent, low-voltage, and halogen — are combined, it's important to keep track of the color temperature and the color rendition index of each light.

Color temperature is measured in degrees Kelvin (K) and indicates the color of the lamp itself when you see it turned on. Standard household incandescents have a color temperature of about 2700°K; they look "warm" and have a red-based undertone. Halogen lamps run about 3000°K and are noticeably whiter; these are considered "neutral." Fluorescents range from 3000°K to 7500°K; those on the high end, so-called "cool" wands, have a blue tone. Try to keep all the lamps you use in a kitchen close in color temperature, or they'll clash. I lean toward all warm or all neutral. Cool lights don't go well with skin and wood tones.

The color rendition index (CRI) is based on an arbitrary scale of 100 and measures how true the color of an object looks in the light cast from a lamp. For the best color rendition, you want to use a light with a CRI close to 100 — the CRI of daylight. Incandescents, halogens, and low-voltage lamps generally have very high CRIs (99 to 100). But the old standard fluorescent F40-CW, which you see in supermarkets and office buildings, has a CRI around 67.

Read your lamp tables carefully: In the Philips line, one warm-white tube (F40WW) has a CRI of 53 (cost is about $3), while another (F40/SPEC30) has a CRI of 70 (cost is about $4). But the one I would use (F40/30U) has a CRI of 85 (cost is about $8). The only Philips tube with a higher CRI (92) is the Colortone 50 (F40/C50) It costs about $6, but it has a color temperature of 5000°K, which is far too cool for my taste. Most compact fluorescents have a respectable CRI of 82.

— *P. T.*