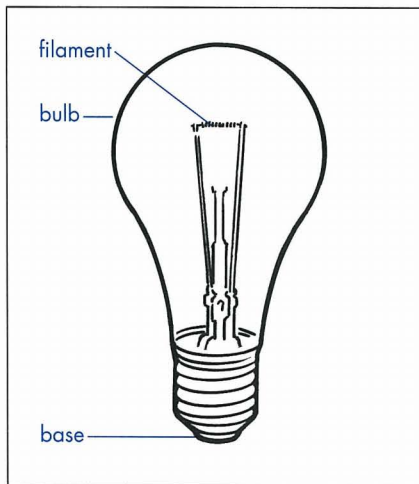


Incandescent



Incandescent lamps convert electric power into light by passing electricity through a filament of coiled tungsten wire, heating it until it glows. The lamps usually are filled with an inert gas mixture consisting primarily of argon. Of the energy that goes into the incandescent filament, only 10 to 15 percent is emitted as light; the rest is emitted as heat.

Incandescent lamps come in a variety of shapes and sizes. The letter designation refers to the shape, and the number indicates the maximum diameter of the lamp in eighths of an inch. For example, A19 lamps are the shape most commonly found in homes, and are 19 eighths of an inch in diameter (2 $\frac{3}{8}$ inches) at the widest point. Different base types are available; the most common type is a medium screwbase. The

glass bulb can be clear, diffuse, or even colored, or it can have a reflective coating on the inside. Both directional and nondirectional incandescent lamps are available.

Qualities

Color: Excellent; color temperature decreases when incandescent lamps are dimmed.

Light Output: See the table for each lamp type for light output ratings.

Energy and Cost

Wattage: See the table for each lamp type for wattages.

Efficacy: Low efficacies (from 6 to 20 lumens per watt) compared to fluorescent lamps. Improved-efficacy incandescent lamps are available.

Life: Short (from 750 to 2000 hours) compared to fluorescent lamps. Dimming incandescent lamps extends their life.

Cost: Common A-lamps are inexpensive, but some reflector and specialty lamps are more expensive than fluorescent lamps. See the table for each lamp type for typical incandescent lamp costs.

Where to Buy: A-lamps are readily available in supermarkets, discount stores, and hardware stores, as are most common reflector (R) and parabolic aluminized reflector (PAR) lamps. Lighting stores and electrical suppliers carry special shapes.

Use

Installation: Where lower light output is acceptable, replace an incandescent lamp with a lower-wattage incandescent lamp for energy savings. Use incandescent lamps where excellent color rendering and good optical control of light are essential. Because incandescent lamps have low efficacies, restrict their use to applications where short hours of use are expected, where the lamps are frequently switched, where the lamps will be exposed to extremely cold temperatures, or where there are no other alternatives.

Controls: Easily dimmed.

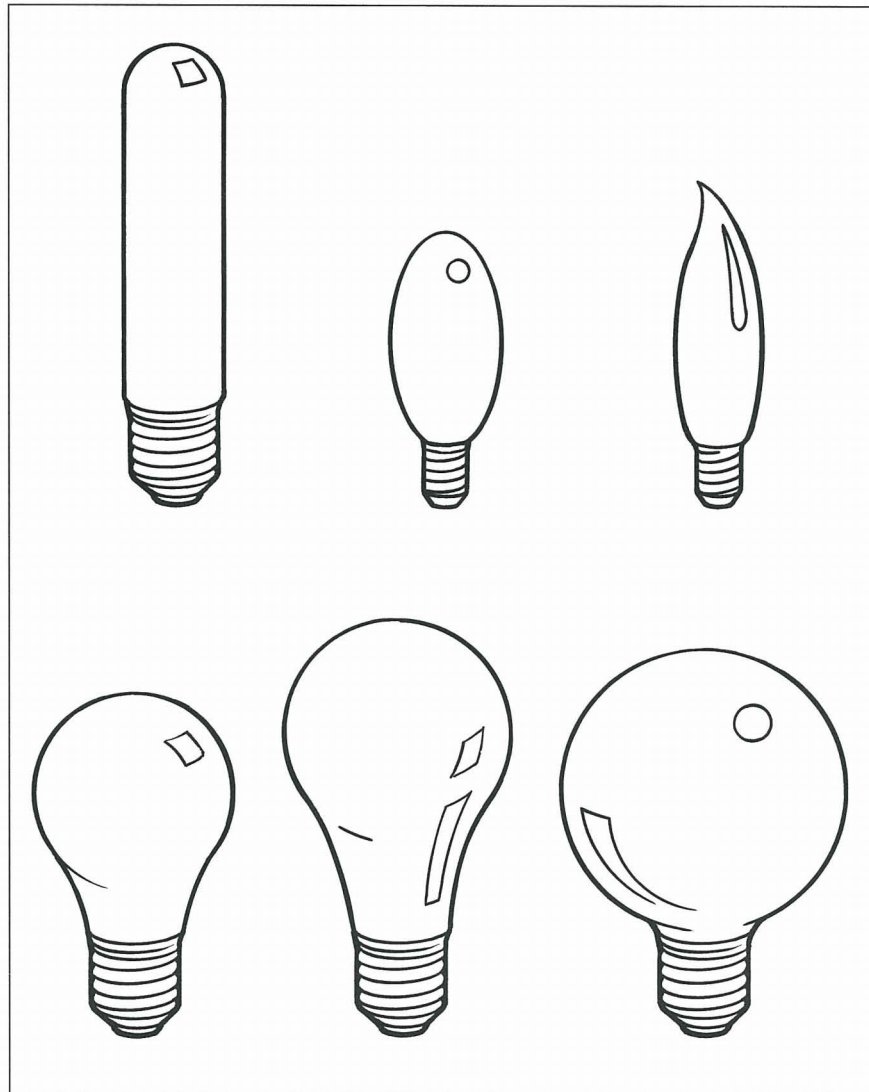
Cautions: Incandescent lamps become very hot; keep combustible materials away from the lamp.

For more information refer to

Designs: Incandescent lamps commonly are used throughout a home.

Other Lamps: Fluorescent, High-Intensity Discharge

Incandescent: Common



Common incandescent lamps come in a variety of shapes and sizes. Decorative candle lamps are often used in chandeliers. Tubular or “showcase” lamps are used in some plug-in desk lamps, furniture-integrated luminaires, and artwork luminaires. Globe lamps (G-lamps) are spherical and typically are used where the lamp can be seen. A three-way lamp has two filaments. When used with a three-level socket, either or both filaments can be lit to provide three levels of light. All common incandescent lamps are nondirectional.

Like many common incandescent lamps, A- and G-lamps are available with either clear or frosted bulbs. As a rule of thumb, use lamps with clear bulbs when you want to see the filament, and frosted lamps when you do not. If the filament is visible, the light will be very intense and the direct glare may be unacceptable to residents. Frosted lamps diffuse the light.

Qualities

Color: Excellent.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	CCT (K)	CRI	Typical Price per Lamp (\$)
Common Incandescent						
A19, Inside Frost	40	1,000–1,500	460–505	2,800	95+	0.75
A19, Inside Frost	60	1,000	870–890	2,800	95+	0.75
A19, Inside Frost	75	750	1,190–1,220	2,800	95+	0.75
A19, Inside Frost	100	750	1,750	2,800	95+	0.75
A21, Inside Frost	150	750	2,850	2,800	95+	1.75
A21 or T21, Inside Frost	50–100–150	1,200–1,500	580–2,220	2,800	95+	2.00
Candle	40	1,500	—	2,800	95+	1.00
Candle	60	1,500	—	2,800	95+	1.00
C7 Night Light, Clear	7	3,000	45	2,800	95+	1.00
G16.5	40	1,500	245–345	2,800	95+	2.25
G25	40	1,500	370–425	2,800	95+	2.50
G25	60	1,500	660–715	2,800	95+	2.50
G40	60	2,500	576–740	2,800	95+	5.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

Energy and Cost

Efficacy: Low. Improved-efficacy incandescent lamps are available.

Life: Short compared to fluorescent lamps. Longer-life incandescent lamps are available.

Cost: Inexpensive, but decorative or multi-level lamps are more expensive than common A-lamps.

Where to buy: A-lamps are readily available in supermarkets, discount stores, and hardware stores. Lighting stores and electrical suppliers carry special shapes.

Use

Installation: Where lower light output is acceptable, replace a common incandescent lamp with a lower-wattage incandescent lamp for energy savings. Because common incandescent lamps have low efficacies, restrict their use to applications where short hours of use are expected, where the lamps are frequently switched, where decorative lamps are needed, or where there are no other alternatives.

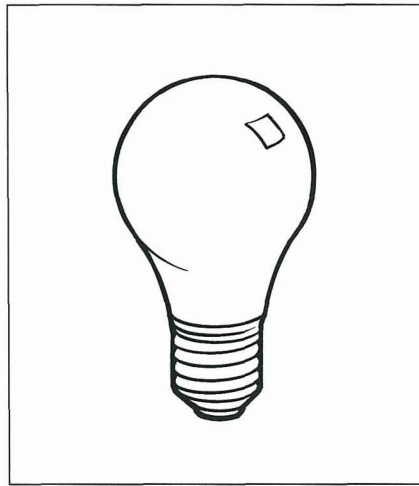
Controls: Easily dimmed.

For more information refer to

Designs: Medium Living Room, Small Bath, Large Bath, Foyer with Open Stair, Multi-Family Lobby

Other Lamps: Reduced-Wattage Incandescent, Halogen A Incandescent, Reflector, Screwbase Compact and Circline Fluorescent

Incandescent: Reduced-Wattage



Reduced-wattage incandescent A-lamps are shaped like other incandescent A-lamps, but the gas fill is different, allowing lower wattages or longer life. Lamps of 25 watts and higher have an argon fill, with a small percentage of nitrogen. The addition of krypton improves efficacy and offers opportunities for longer life. Thus, two types of reduced-wattage A-lamps are available: 1) reduced-wattage, and 2) reduced-wattage with extended life. The table compares the light output, efficacy, and lamp life of three

common A-lamps with corresponding reduced-wattage and long-life versions. The data show that standard-life, reduced-wattage lamps have lower light output than common lamps. However, the wattage reduction more than offsets the lower light output, thus giving the reduced-wattage versions a slightly higher efficacy than the common lamps.

Reduced-wattage, long-life incandescent A-lamps are recommended only in applications where replacing lamps is difficult. As the table indicates, life is extended to 2500 hours, but light output is reduced by as much as 30 percent, compared with the corresponding common lamp. As a result, efficacy is also reduced.

Reduced-wattage incandescent lamps have the same nondirectional light distribution as the common A-lamps they may replace.

Comparison of Reduced-Wattage and Common Incandescent A-Lamps

	Rated Lamp Watts	Light Output (lumens)	Efficacy (lumens/watt)	Lamp Life (hours)
Common	100	1,750	17.5	750
	75	1,190–1,220	15.9–16.3	750
	60	870–890	14.5–14.8	1,000
Reduced-Wattage	90	1,620	18.0	750
	67	1,130	16.9	750
	52	800	15.4	1,000
Reduced-Wattage, Long-Life	90	1,360–1,375	15.1–15.3	2,500
	67	930–945	13.9–14.1	2,500
	52	700–705	13.5–13.6	2,500

Qualities

Color: Same as common incandescent lamps.

Light Output: Lower than common incandescent lamps.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	CCT (K)	CRI	Typical Price per Lamp (\$)
Reduced-Wattage and Reduced-Wattage, Long-Life						
Reduced-Wattage A-Lamp	52	1,000	800	2,800	95+	1.00
Reduced-Wattage A-Lamp	67	750	1,130	2,800	95+	1.00
Reduced-Wattage A-Lamp	90	750	1,620	2,800	95+	1.00
Reduced-Wattage A-Lamp	135	750	2,580	2,800	95+	1.25
Reduced-Wattage, Long-Life A-Lamp	52	2,500	700–705	2,800	95+	1.50
Reduced-Wattage, Long-Life A-Lamp	67	2,500	930–945	2,800	95+	1.50
Reduced-Wattage, Long-Life A-Lamp	90	2,500	1,360–1,375	2,800	95+	1.50
Reduced-Wattage, Long-Life A-Lamp	135	2,500	2,105–2,145	2,800	95+	2.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

Energy and Cost

Wattage: Lower than common incandescent lamps.

Efficacy: Slightly higher than common incandescent lamps, except for long-life lamps, which have lower efficacy than common lamps.

Life: Shorter than fluorescent lamps, but reduced-wattage, long-life incandescent A-lamps last two-and-a-half to three times as long as common incandescent A-lamps.

Cost: Slightly higher than common incandescent lamps.

Where to Buy: Supermarkets, lighting, hardware, and convenience stores.

Use

Installation: Easily replace common lamps. These lamps are best used where a slight reduction in light output will be acceptable. If this is the case, lower-wattage common incandescent lamps should also be considered (that is, 40-watt or 60-watt lamps instead of 60-watt or 75-watt lamps, respectively). Because of their reduced efficacy, long-life lamps should be avoided unless replacing lamps is inconvenient and all other alternatives have been eliminated.

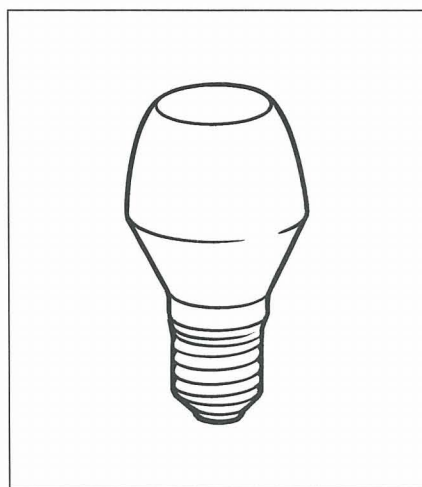
Luminaires: Reduced-wattage A-lamps can screw directly into any luminaire that is designed to operate common incandescent A-lamps.

Controls: Easily dimmed.

For more information refer to

Other Lamps: Halogen A Incandescent, Reflector, Screwbase Compact and Circline Fluorescent

Incandescent: Halogen A



Halogen incandescent lamps have a slightly different shape and a thicker and heavier glass bulb than the common incandescent A-lamps they may replace. Like common incandescent lamps, halogen lamps produce light when electricity is passed through a tungsten filament, heating the filament until it glows. The filament evaporates over a lamp's life, causing the bulb wall to blacken slowly, with loss of light and eventual lamp failure through disintegration of the filament. In halogen lamps, chemicals called

halogens are introduced in the gas fill to minimize the problem of filament evaporation. The halogens redirect evaporated tungsten onto the filament, rather than onto the bulb wall. As a result, the light output does not degrade as rapidly as it does with common incandescent lamps, so lamp life is extended.

Although most halogen lamps are dimmable, dimming the lamps reduces their burning temperature. The halogen cycle is most effective when lamps are operating with the hotter interior bulb temperatures that are created with full operation. If these lamps are dimmed regularly during operation and the lamps begin to blacken, operate them briefly at full output. Operating them on dimmer circuits will not offset their longer life nor interfere with the energy and economic advantages of their use in homes.

Halogen incandescent lamps have the same nondirectional light distribution as common A-lamps.

The table compares the light output, efficacy, and lamp life of halogen incandescent lamps with common incandescent lamps.

Comparison of Halogen and Common Incandescent A-Lamps

	Rated Lamp Watts	Light Output (lumens)	Efficacy (lumens/watt)	Lamp Life (hours)
Common	100	1,750	17.5	750
	75	1,190–1,220	15.9–16.3	750
	60	870–890	14.5–14.8	1,000
	40	460–505	11.5–12.6	1,000–1,500
Halogen	100	1,600–1,880	16.0–18.8	2,250–3,000
	72, 75	1,090–1,300	15.1–17.3	2,250–3,500
	60	960	16.0	3,000
	52	885	17.0	3,500
	42	665	15.8	3,500

Qualities

Color: Excellent. Halogen lamps emit slightly whiter light than other incandescent lamps.

Light Output: Less lumen depreciation over the life span of the lamp.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	CCT (K)	CRI	Typical Price per Lamp (\$)
Halogen						
Halogen A-Lamp	42	3,500	665	3,050	95+	4.00
Halogen A-Lamp	52	3,500	885	3,050	95+	4.00
Halogen A-Lamp	60	3,000	960	3,050	95+	4.00
Halogen A-Lamp	72, 75	2,250–3,500	1,090–1,300	3,050	95+	4.00
Halogen A-Lamp	100	2,250–3,000	1,600–1,880	3,050	95+	4.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

Energy and Cost

Wattage: Typical halogen A-lamps are 42, 52, 60, 72, 75, and 100 watts.

Efficacy: Slightly more efficacious than common incandescent lamps; less efficacious than fluorescent lamps. The efficacy is reduced when lamps are dimmed.

Life: Longer than common lamps, reduced-wattage lamps, and most reduced-wattage, long-life lamps. Shorter life than fluorescent lamps.

Cost: About four times more expensive than common lamps. Electric utility company incentives may offer substantial savings.

Where to Buy: Lighting stores and utility promotions. Sometimes available at supermarkets, hardware stores, and drugstores.

Use

Installation: Easily replace common lamps. Due to their long life, they are ideal for luminaires where lamp replacement is inconvenient.

Luminaires: Can be screwed directly into any luminaire that is designed to operate common incandescent A-lamps.

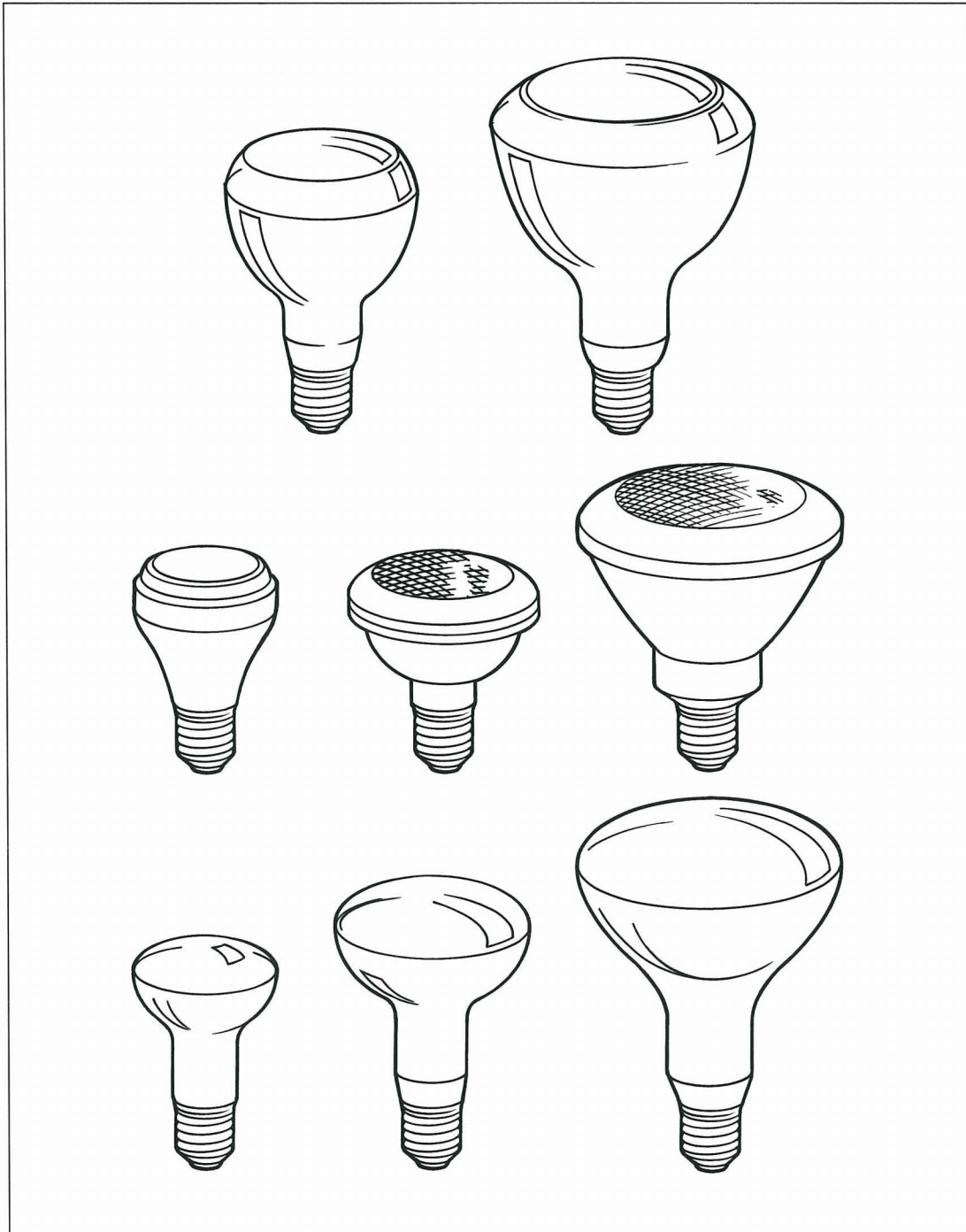
Controls: Can be dimmed. Occasionally they should be operated at full output to retain the benefits of the halogen cycle.

For more information refer to

Designs: Small Kitchen, Large Kitchen, Small Dinette, Medium Dinette, Dining Room, Small Living Rooms, Medium Living Rooms, Large Living Rooms 1 and 3, Half Bath, Medium Bath 2, Small Bedroom, Children's Bedroom, Large Bedroom, Home Office, Multi-Family Fire Stair 1, Entry 1

Other Lamps: Reflector, Screwbase Compact and Circline Fluorescent

Incandescent: Reflector



The bulbs of incandescent reflector lamps have reflective coatings, so they are directional light sources. Available in a number of bulb shapes, they typically operate on standard line voltage (120 V) and have medium screwbases. The shape of the light beam is cone-like, and can be specified in a range of beam spreads, from "narrow spot" to "wide flood." A "spot" lamp will have a narrower distribution, with greater intensity at the center of the beam, than a "flood" lamp with the same wattage and bulb shape. For this reason, candela distribution data, particularly "center beam candlepower" (CBCP), is more useful to the designer than light output when selecting reflector lamps. The major types, shown above from top to bottom, are: ellipsoidal reflector (ER), parabolic aluminized reflector (PAR), and common reflector (R).

The most common R-lamps found in homes are the 75-watt R30 and the 150-watt R40. Both offer opportunities for energy-efficient replacement, either with compact fluorescent reflector lamps or with halogen PAR-lamps. ER-lamps focus the beam approximately 2 inches in front of the bulb, thus making these lamps an efficient choice in deep, well-shielded luminaires. Both R- and ER-lamps are molded from "soft" soda lime glass and should not be used outdoors without an enclosure.

PAR-lamps provide better optical control than R30 or R40 lamps. Incandescent PAR-lamps, particularly the 75- and 150-watt PAR38, have been used extensively for residential outdoor area lighting. Newer products place halogen capsules within PAR enclosures in a wide variety of sizes and wattages, greatly improving the lamps' efficacies. Due to the relatively low efficacy of R-lamps and nonhalogen PAR-lamps, the Energy Policy Act of 1992 will restrict their use in the future. Among the most popular halogen PAR-lamps are the 45- to 75-watt PAR16 and the 50-watt PAR20 and PAR30, which provide good beam control, compact size, and efficient operation. A further variation is the halogen infrared (IR) PAR, which employs an IR-reflective coating to redirect infrared energy back onto the filament, thereby increasing efficacy.

The table compares the light output, efficacy, and lamp life of some common PAR-, halogen PAR-, and halogen IR PAR-lamps.

CONTINUED

**Comparison of
PAR38, Halogen
PAR38, and
Halogen IR
PAR38 Flood
Lamps**

	Rated Lamp Watts	Light Output (lumens)	Efficacy (lumens/watt)	Lamp Life (hours)
PAR38	150	1,740	11.6	2,000
Halogen PAR38	90	1,270	14.1	2,000
Halogen IR PAR38	60	1,150	19.2	2,500

Qualities

Color: Excellent. Compared to an incandescent reflector lamp of the same wattage, a halogen reflector lamp has a slightly higher CCT. Usually, this causes the light that is produced by the halogen lamp to be slightly whiter in appearance than the light from the incandescent lamp.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	Center Beam Candlepower (candelas)	Beam Spread (°)	CCT (K)	CRI	Typical Price per Lamp (\$)
Reflector								
R20	50	2,000	410–420	510–550	38–43	2,800	95+	5.00
R30 Flood	75	2,000	830–900	430–470	65–130	2,800	95+	4.50
R40 Flood	150	2,000	1,900	1,300–1,400	59–76	2,800	95+	5.50
R40 Heat Lamp	250	5,000	—	—	—	—	—	15.00
ER30	75	2,000	850	1,200	42	2,800	95+	6.50
PAR38 Flood	75	2,000	750–765	1,750–1,800	30–37	2,800	95+	5.00
PAR38 Flood	150	2,000	1,740	3,100–4,000	30–36	2,800	95+	5.00
Halogen PAR16 Narrow Flood	55	2,000	—	1,300	30	3,050	95+	14.00
Halogen PAR20 Narrow Flood	50	2,000–2,500	560	1,250–1,400	30–32	3,050	95+	9.00
Halogen PAR30 Flood	50	2,000–2,500	670	1,100–1,600	36–42	3,050	95+	9.00
Halogen PAR38 Flood	45	2,000	540	1,600–1,800	32	3,050	95+	10.00
Halogen PAR38 Flood	90	2,000–2,500	1,270	3,500–4,000	30	3,050	95+	10.00
Halogen IR PAR38 Flood	60	2,000–2,500	1,150	3,300	32	3,050	95+	12.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

Energy and Cost

Efficacy: Halogen IR PAR-lamps are up to 65 percent more efficacious than common PAR-lamps of similar beam spread.

Life: Longer than common incandescent lamps. Halogen PAR-lamps have lower lumen depreciation over the life of the lamp.

Cost: Much more expensive than A-lamps. R-lamps are the least expensive reflector lamps; halogen IR PAR-lamps are the most expensive.

Where to Buy: Discount stores, supermarkets, hardware stores, and drugstores carry basic sizes. Lighting stores and electrical suppliers carry a larger selection of beam spreads and sizes for halogen PAR-lamps.

Use

Installation: Use reflector lamps to replace A-lamps in applications such as track heads, recessed downlights, and wall wash, accent, and exterior flood luminaires. Reflector lamps of lower wattages than A-lamps can be used when directional light is needed. Reflector lamps fit into the same medium-based sockets as common incandescent lamps. Because diameters vary among the reflector lamps, however, check to be sure the lamp fits in the luminaire housing. For example, a PAR38 flood is 38 eighths of an inch ($4\frac{3}{4}$ inches) in diameter, which may be too wide for some track heads or recessed downlights. The length of the lamp is also a factor. Some R-lamps may protrude below the ceiling plane in a recessed downlight, and some PAR-lamps may be too short for proper light distribution.

Luminaires: Ceiling- or Wall-Mounted Track or Adjustable Heads, Recessed, Exterior Large-Area Flood

Controls: Can be dimmed. Efficacy is reduced when lamps are dimmed.

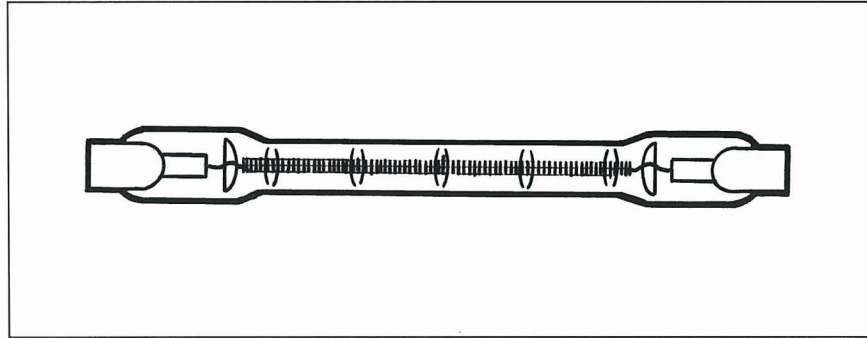
Cautions: Do not use R- or ER-lamps in exposed exterior luminaires.

For more information refer to

Designs: Medium Kitchen 1, Dining Room, Large Living Rooms, Medium Bath 1, Large Bath, Closed Stair, Hallway, Floodlights

Other Lamps: Low-Voltage Halogen, Screwbase Compact Fluorescent with Integral Accessories

Incandescent: Tubular-Shaped Halogen



Tubular-shaped halogen lamps offer some of the same advantages as halogen A-lamps and halogen PAR-lamps. The halogen cycle provides greater efficacy, lower lumen depreciation over lamp life, and longer life than common incandescent lamp technology. The bulb wall of a tubular-shaped halogen lamp is made of quartz glass that can withstand high operating temperatures. Lamps should be handled carefully because the high temperatures may crack the quartz envelope if it has been etched with oils from hands and fingers.

Typical double-ended tubular-shaped halogen lamps are from 3 to 5 inches long and 100 to 1500 watts. Single-ended versions range from 75 to 500 watts. The single-ended lamps are available in line- and low-voltage varieties.

Tubular-shaped halogen lamps are nondirectional sources. Because of their high operating temperatures and different lamp bases, tubular-shaped halogen lamps are not direct replacements for common or halogen A-lamps. Thermal control and socket design within the luminaire are critical for the satisfactory performance of these lamps. For safety reasons, the lamps must be protected by a glass cover to prevent potential damage from lamp rupture.

Like the halogen IR PAR-lamps described in the Reflector Lamps section, some tubular-shaped halogen lamps have a special coating that directs infrared heat back to the filament, increasing efficacy. A 350-watt tubular-shaped IR-coated halogen lamp can replace a 500-watt tubular-shaped halogen lamp with similar light output, but at a higher lamp price.

Qualities

Color: Excellent color rendering characteristics.

Light Output: Less lumen depreciation over life than common incandescent lamps.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	CCT (K)	CRI	Typical Price per Lamp (\$)
Tubular-Shaped Halogen						
Tubular-Shaped, RSC Base	300	2,000	5,600–6,000	3,050	95+	10.00
Tubular-Shaped, RSC Base	500	2,000	10,500–11,100	3,050	95+	10.00
Tubular-Shaped IR, RSC Base	350	2,000	10,000	3,050	95+	30.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

Energy and Cost

Wattage: Tubular-shaped halogen lamps often are high-wattage lamps.

Efficacy: Higher (16 to 29 lumens per watt) than other incandescent lamps. The tubular-shaped IR halogen lamps are more efficacious than those without an IR coating. Efficacy decreases when lamps are dimmed.

Life: Up to 2000 hours.

Cost: High compared with many other incandescent and some fluorescent lamps.

Where to Buy: In some geographic areas, the availability of tubular-shaped halogen lamps may be limited to lighting stores. Most luminaires purchased for residential use, however, are supplied with at least one lamp.

Use

Installation: Not direct replacements for common incandescent lamps. Tubular-shaped halogen lamps only fit into specific sockets.

Luminaires: Chandeliers, Recessed, Sconces, Desk Lamps, Floor Lamps, Exterior Large-Area Flood

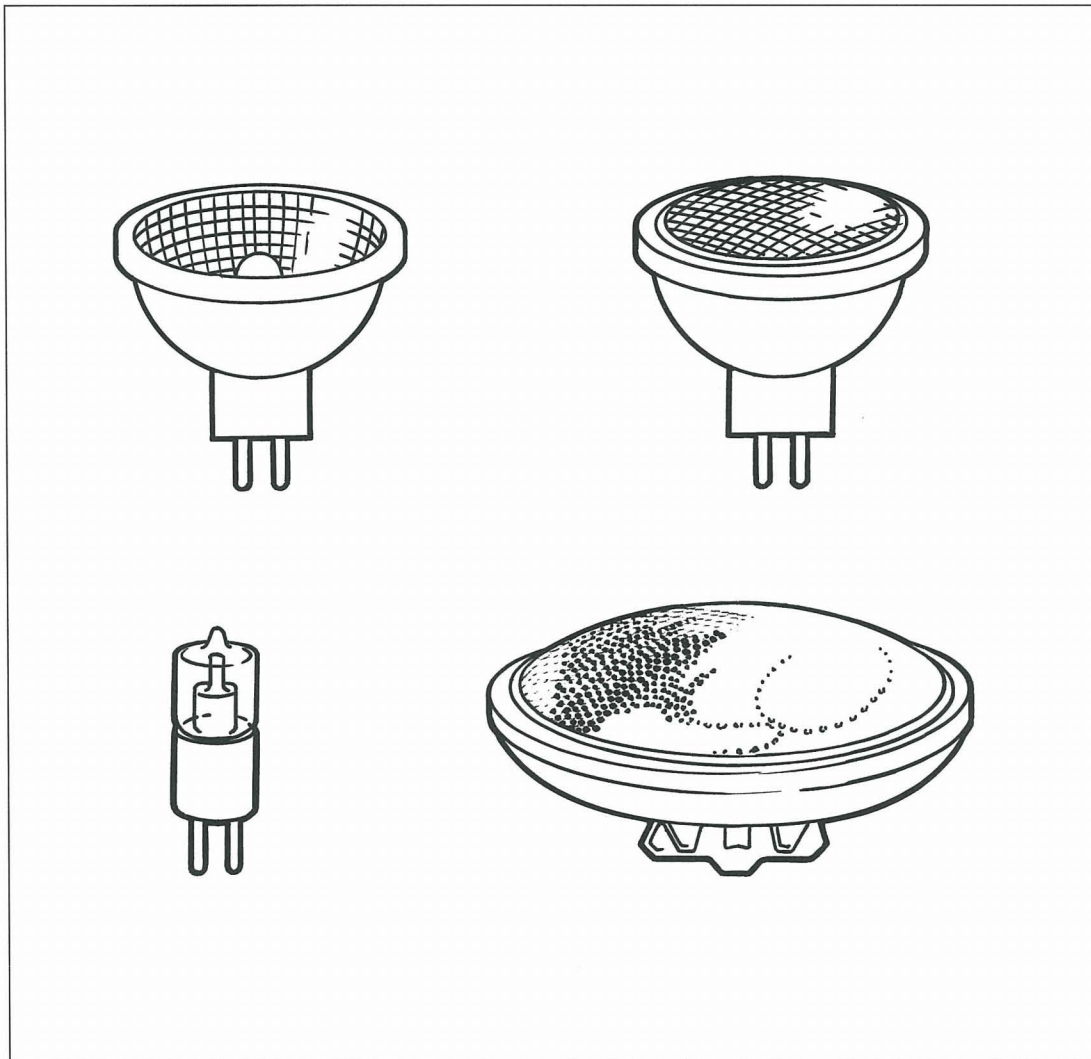
Controls: Can be dimmed. Occasionally they should be operated at full light output to retain the benefits of the halogen cycle.

Cautions: Avoid using in locations where combustible materials could come in contact with the lamp. The lamps produce ultraviolet radiation that may be harmful if light is not first absorbed or filtered by a glass shield. Underwriters Laboratories now requires that all halogen lamps be shielded for safety reasons.

For more information refer to

Other Lamps: Reflector, Low-Voltage Halogen

Incandescent: Low-Voltage Halogen



Low-voltage halogen lamps operate at less than 30 volts (typically 12 volts) and therefore require transformers to reduce the voltage supplied to the lamp. Their short, thick filaments allow compact lamp size, as shown above at lower left, and excellent optical control. Popular low-voltage halogen lamps include small multi-faceted reflector (MR) lamps, shown in the top row, and some PAR-lamps, lower right, commonly used in track lighting. Low-voltage halogen lamps are not a direct replacement for other types of incandescent lamps because they need a transformer and because their bases do not fit into the sockets that are designed for other incandescent lamps. Due to the initial investment required to install low-voltage lighting systems, they are better suited for accent lighting than ambient lighting. Their efficiency results from delivering light precisely where it is wanted and producing little wasted light. The number after the letter designation refers to the lamp's diameter in eighths of an inch. For example, an MR16 is 16 eighths of an inch, or 2 inches, in diameter. Low-voltage halogen lamps such as the MR16 and MR11 are directional sources.

Qualities

Color: Excellent.

Lamp Type	Rated Lamp Watts	Average Rated Lamp Life (hours)	Light Output (lumens)	Center Beam Candlepower (candelas)	Beam Spread (°)	CCT (K)	CRI	Typical Price per Lamp (\$)
Low-Voltage Halogen								
PAR36 Narrow Spot	50	4,000	400	11,000	8	3,050	95+	14.00
MR11 (FTF)*	35	3,000	460	2,750–3,000	20	2,950	95+	14.00
MR16 Flood (BAB)*	20	2,000–4,000	280	460–850	36–40	2,925	95+	12.00
MR16 Flood (EXN)*	50	2,000–4,000	960	1,500–2,500	38–40	3,050	95+	12.00
Bi-pin Halogen	35	2,000	650	—	—	3,050	95+	15.00

CCT = Correlated Color Temperature CRI = Color Rendering Index

* The three-letter code is an American National Standards Institute (ANSI) designation that identifies a lamp of a certain beam spread and wattage.

Energy and Cost

Wattage: Save energy by using low-voltage halogen lamps to replace higher-wattage lamps that do not deliver light effectively to the task.

Efficacy: Similar to other halogen reflector lamps.

Life: Up to 4000 hours.

Cost: High. Low-voltage operation requires a transformer, increasing the cost of the system.

Where to Buy: In some geographic areas, the availability of low-voltage lamps may be limited to lighting stores. Most low-voltage luminaires that are purchased for residential use are supplied with a lamp.

Use

Installation: Low-voltage lamps only fit into luminaires that are designed exclusively for their use. Low-voltage track lighting, recessed luminaires, and ceiling-mounted downlights are available. The size of the transformer may negate the advantage of the smaller luminaire size unless the transformer is remotely located. Compact lamp size permits flexible and inconspicuous lighting applications, such as in display cabinets. The lamp can be located close to the task, which increases illumination but reduces the area that is illuminated.

Luminaires: Track, Suspended Downlights, Accent, Shelf or Display Cabinet

Controls: Dimmable; use dimmers designed specifically for low-voltage lamps.

Cautions: As with line-voltage types, low-voltage halogen lamps may burst and therefore require shielding. They produce ultraviolet radiation that may be harmful if not filtered. Magnetic transformers may be noisy; electronic transformers are available and are quieter.

These lamps come in a variety of beam spreads, from “very narrow spot” to “flood.” The lamps appear very much alike, so take care to use the manufacturers’ information to select a lamp with the appropriate beam spread.

For more information refer to

Other Lamps: Reflector