GE
Lighting

WORLDWIDE PARTNER

DATA SHEET

ConstantColor™ CMH AR111

Ceramic Metal Halide Lamps
35W and 70W

Product information

GE's CMH-AR111 are an ideal choice for energy-efficient accent and display lighting. The decorative design provides excellent beam control with low glare and superb overall light quality. It is now possible to achieve lighting designs with much lower thermal output than tungsten halogen lamps of similar light output. Now, anyone with critical colour needs can enjoy the excellent savings that CMH-AR111 lamps provide. CMH-AR111 lamps offer substantial benefits that make them the clear choice for specification into new stores, or re-lamping existing store fixtures.

Application areas

- Retail
- Office
- Hospitality
- Commercial areas

Features

- Premium colour rendering and consistency
- Outstanding efficiency and life: 4x better than halogen
- UV Control
- Universal burning position on ECG
- Designed for recessed or track fixtures
- Twist and lock GX8.5 base for a secure fit

GE imagination at work

Specification summary

Wattage [W]	Cap	Product Description	Product Code	Candela [cd]	Beam Angle [°]	Colour	Operating Position	Average Rated Life* [h]	Pack Quantity
CMH AR111									
35	GX8.5	CMH35/R111/UVC/930/GX8.5/SP10	99989	44,000	10	930	U	10,000	6
35	GX8.5	CMH35/R111/UVC/930/GX8.5/FL24	99990	10,000	24	930	U	10,000	6
35	GX8.5	CMH35/R111/UVC/930/GX8.5/FL40	99991	5,000	40	930	U	10,000	6
70	GX8.5	CMH70/R111/UVC/930/GX8.5/SP10	99992	50,000	10	930	U	12,000	6
70	GX8.5	CMH70/R111/UVC/930/GX8.5/FL24	99993	18,000	24	930	U	12,000	6
70	GX8.5	CMH70/R111/UVC/930/GX8.5/FL40	99994	8,500	40	930	U	12,000	6

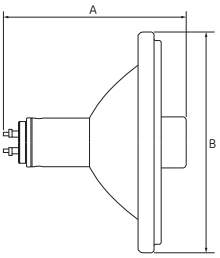
Note: The specification provides typical characteristics for operating on electronic ballasts.
*Initial life claims at launch. Testing in progress to full lamp life.
ConstantColorTM CMH AR111 lamps are compatible with a list of approved electronic ballasts. Contact your GE representative for more information.

General Information

Product Code	99989	99990	99991	99992	99993	99994
Nominal Wattage [W]	35	35	35	70	70	70
Nominal CCT [K]	3000	3000	3000	3000	3000	3000
Format	R-111	R-111	R-111	R-111	R-111	R-111
Lamp Diameter [mm]	111	111	111	111	111	111
Reflector Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Reflector Finish	Aluminized	Aluminized	Aluminized	Aluminized	Aluminized	Aluminized
Mercury Content [Mg]	4.5	4.5	4.5	4.9	4.9	4.9
Operating Conditions						
Burning Position	Universal	Universal	Universal	U (ECG) / V60 (EM)	U (ECG) / V60 (EM)	U (ECG) / V60 (EM)
Luminaire	Open	Open	Open	Open	Open	Open
Electrical Characteristics						
Rated Power [W]	39	39	39	73	73	73
Weighted Energy Consumption [kWh/1000 hours]	34.32	34.32	34.32	64.24	64.24	64.24
Voltage [V]	87	87	87	86	86	86
Current [A]	0.45	0.45	0.45	0.85	0.85	0.85
Max Ignition Voltage [kV]	5	5	5	5	5	5
Min Ignition Voltage [kV]	3	3	3	3	3	3
Extinction Voltage [%]	90	90	90	90	90	90
Photometric Characteristics						
Nominal Beam Angle [°]	10	24	40	10	24	40
Rated Beam Angle [°]	7.5	20	34	9.9	21	34
CBCP	44000	10000	5000	50000	18000	8500
Rated Peak Intensity [Cd]	45000	10800	5600	50000	18900	9600
Nominal Luminous Flux [L]	1800	2100	2100	3200	3900	3900
Rated Luminous Flux [L]	1800	2100	2100	3200	3900	3900
Rated Useful Lumens (90° Cone) [Lm]	1596	1962	2024	2818	3636	3647
Rated Luminous Efficacy [LpW]	46	54	54	44	53	53
Energy Efficiency Class (EEC)	A	A	A	A	A	A
CCT [K]	3000	3000	3000	3000	3000	3000
CCx	0.435	0.435	0.435	0.431	0.431	0.431
CCy	0.394	0.394	0.394	0.400	0.400	0.400
Color Rendering Index [Ra]	88	88	88	91	91	91
Starting and Warm-up Characteristics						
Time to Start @ 10C [Sec]	<5	<5	<5	<5	<5	<5
Time to Start @ -15C [Sec]	<15	<15	<15	<15	<15	<15
Hot Restart Time [Min]	<15	<15	<15	<15	<15	<15
Warm-up to Time to 90% Lumen Output [Min]	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5
Maximum Operating Conditions						
Max Bulb Temperature [°C]	400	400	400	400	400	400
Max Base Temperature [°C]	300	300	300	300	300	300

Dimensions

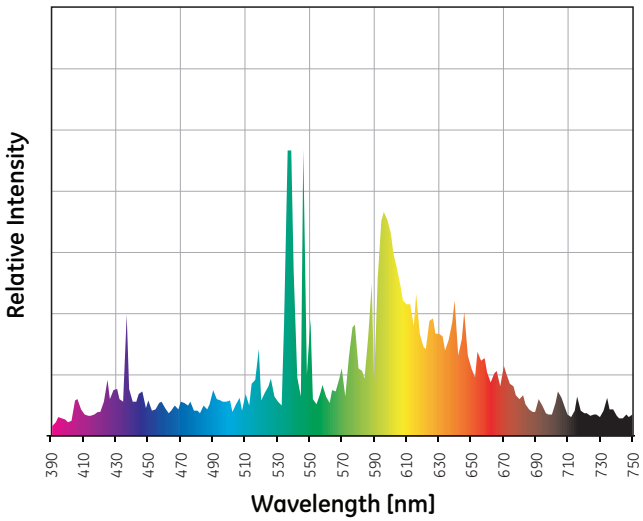
CMH AR111



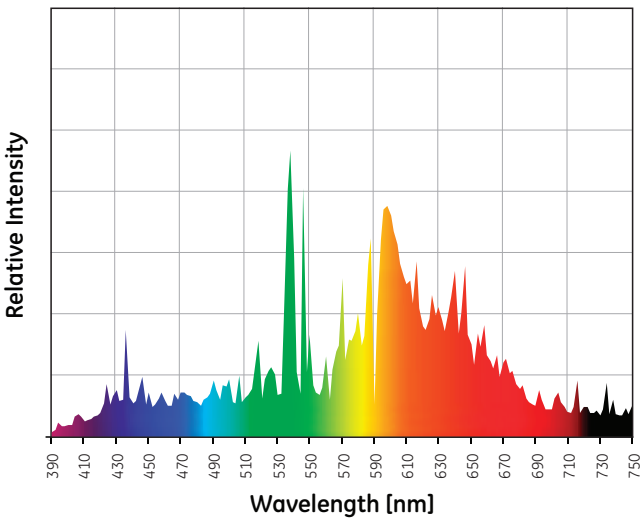
A Maximum Length [mm]	B Maximum Diameter [mm]	Reflector	Operating Position	Fixture Rating
95	111	Aluminum	Universal	Open

Spectral power distribution

CMH 35W 3000K spectral distribution

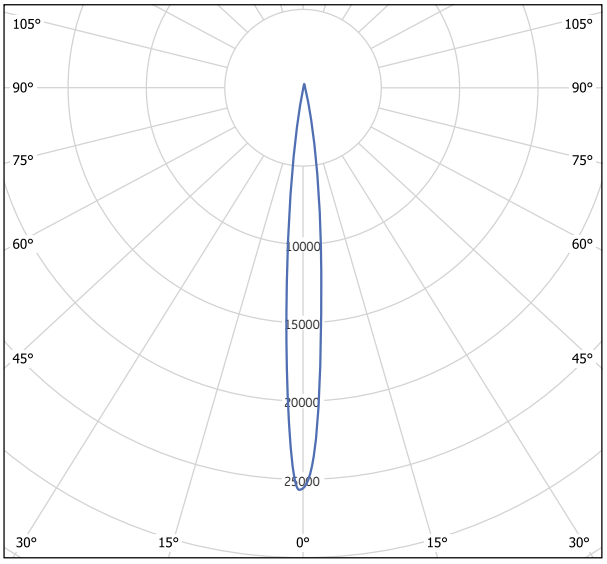


CMH 70W 3000K spectral distribution



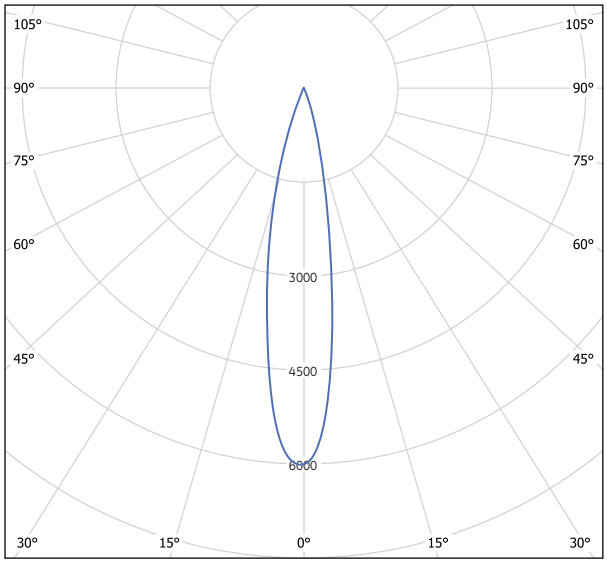
Distribution of luminous intensity

35W CMH-AR111 3000K SP10



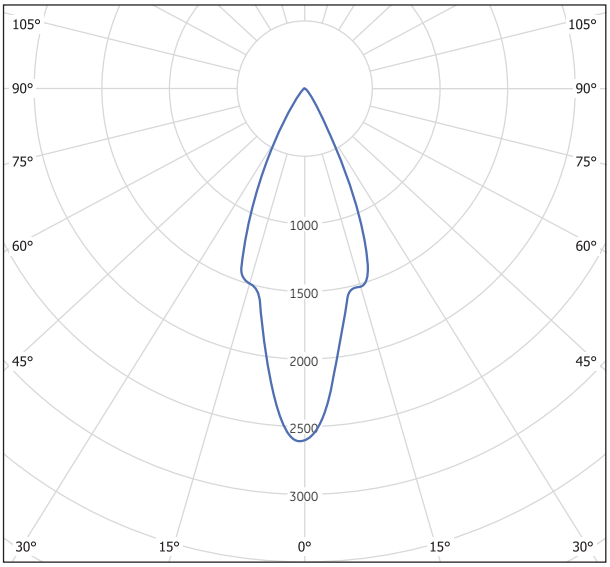
cd/klm

35W CMH-AR111 3000K FL24



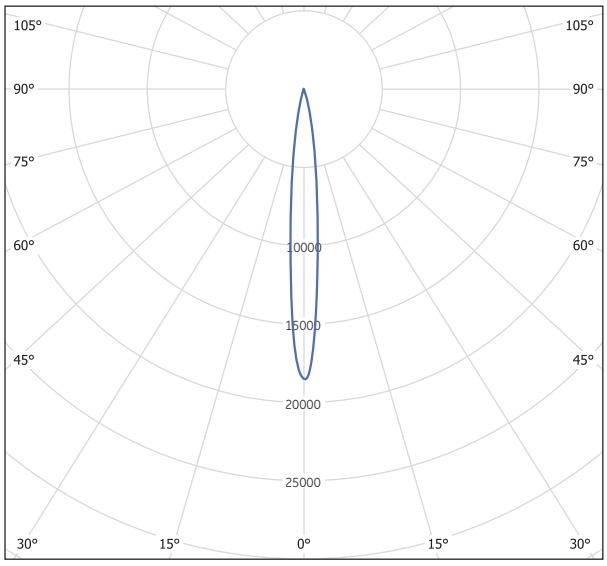
cd/klm

35W CMH-AR111 3000K FL40



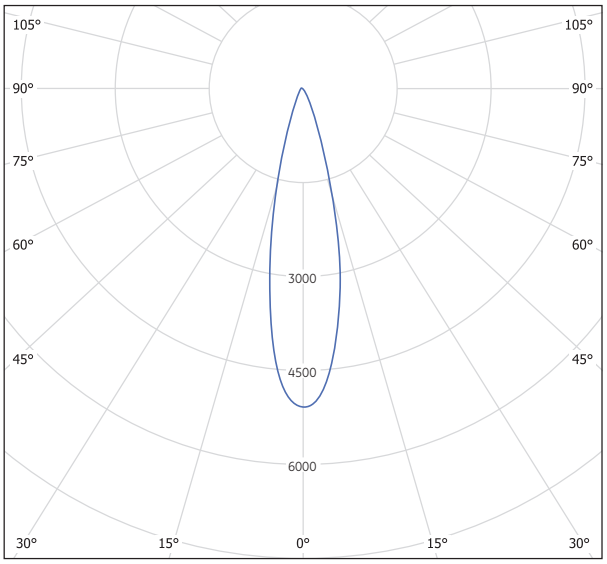
cd/klm

70W CMH-AR111 3000K SP10



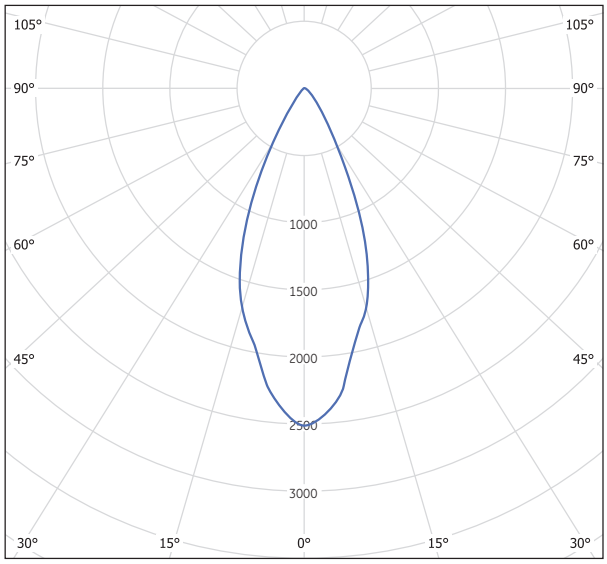
cd/klm

70W CMH-AR111 3000K FL24



cd/klm

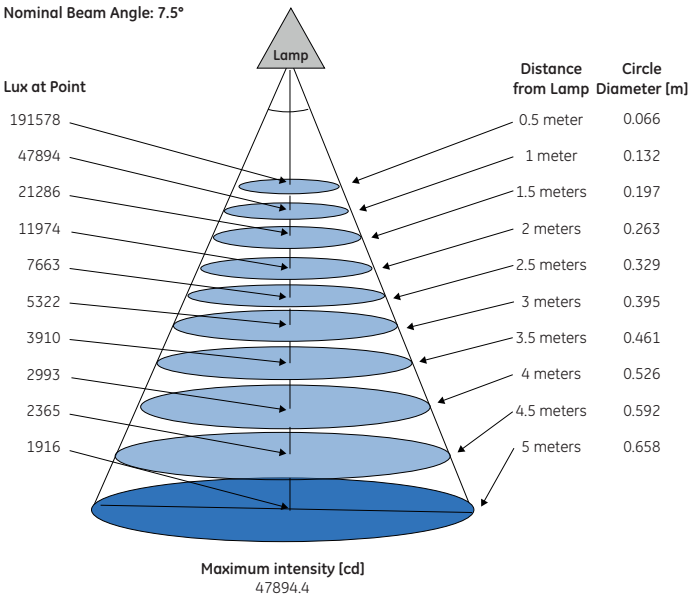
70W CMH-AR111 3000K FL40



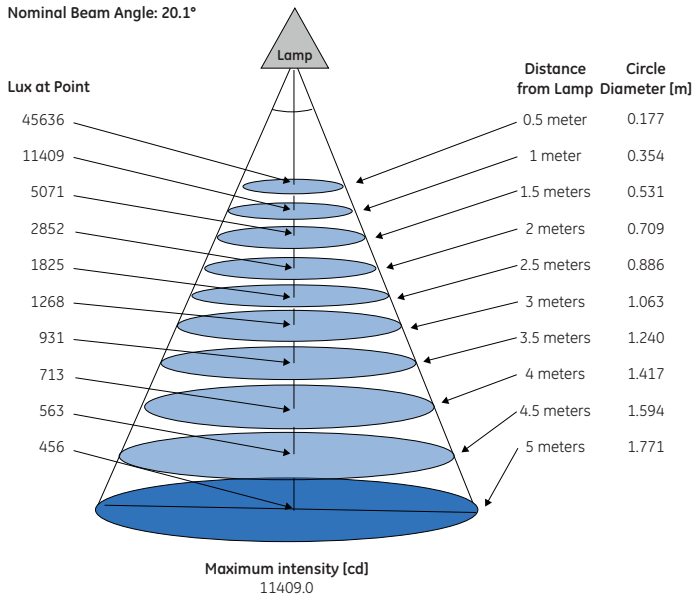
cd/klm

Distribution of luminous intensity

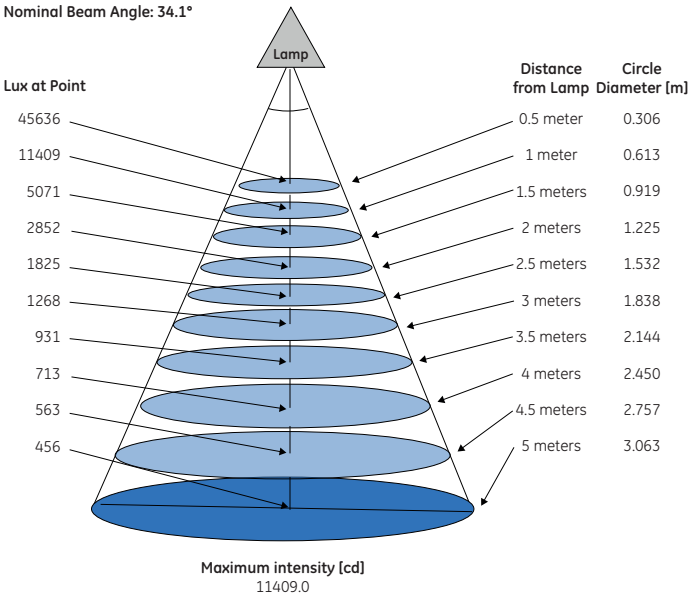
35W CMH-AR111 3000K SP10



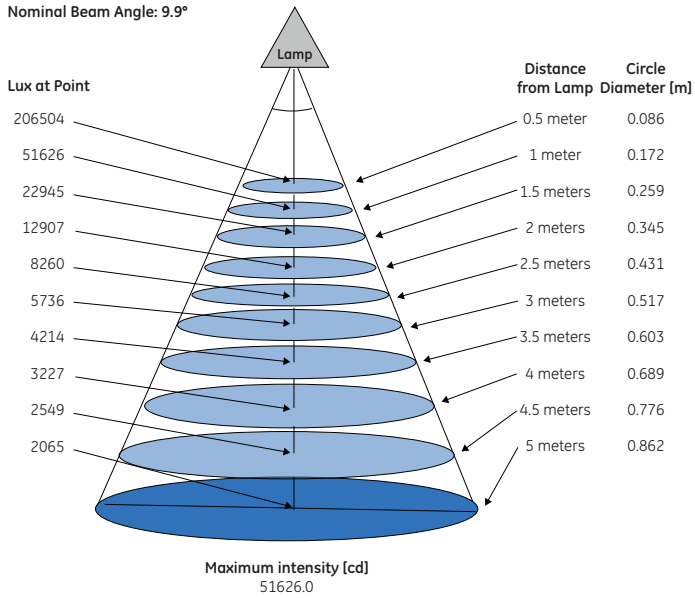
35W CMH-AR111 3000K FL24



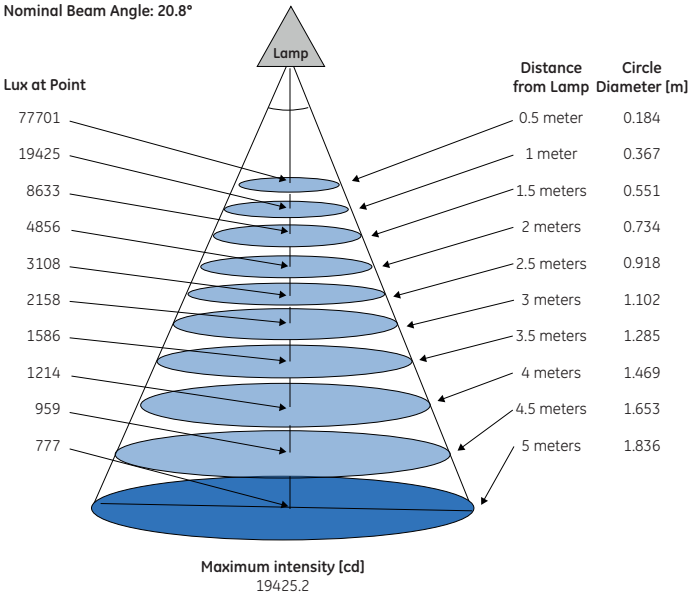
35W CMH-AR111 3000K FL40



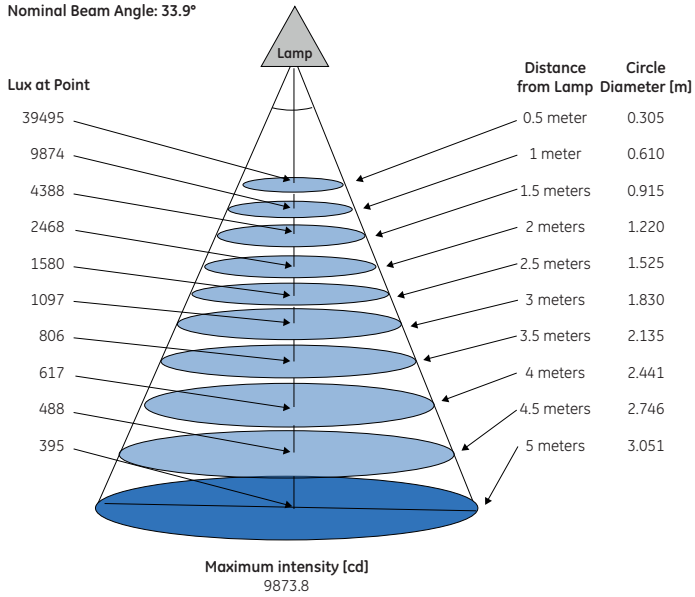
70W CMH-AR111 3000K SP10



70W CMH-AR111 3000K FL24



70W CMH-AR111 3000K FL40

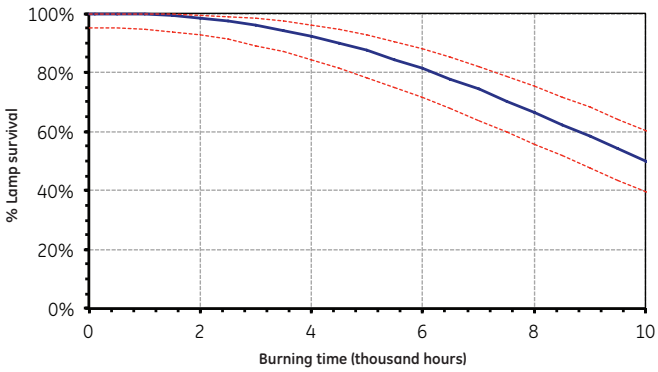


Lamp life

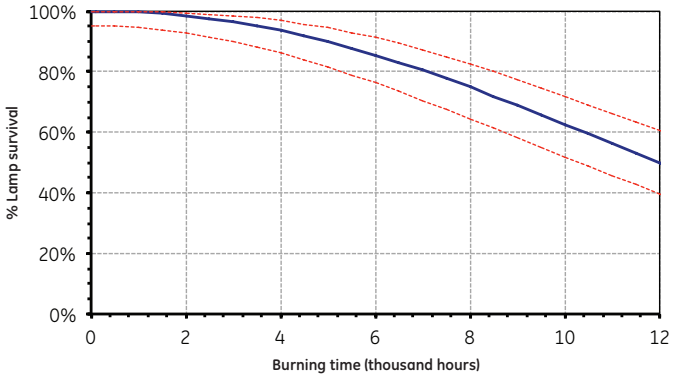
The graphs show the mortality curve of statistically representative batches of lamps operated under controlled conditions of 11 hours per start. The declared lamp life is the median life, which is when 50% of the lamps from a large sample batch would have failed. Lamp life in service will be affected by a number of parameters, such as supply voltage variation, switching cycle, operating position, mechanical vibration, luminaire design and control gear. The information is intended to be a practical guide for comparison with other lamp types. The determination of lamp replacement schedules will depend upon the acceptable reduction in illuminance and the relative costs of spot and group replacement.

Note: The representative curves are taken in Vertical Base Up position.

Lamp Survival CMH 35W 3000K
AR111



Lamp Survival CMH 70W 3000K
AR111

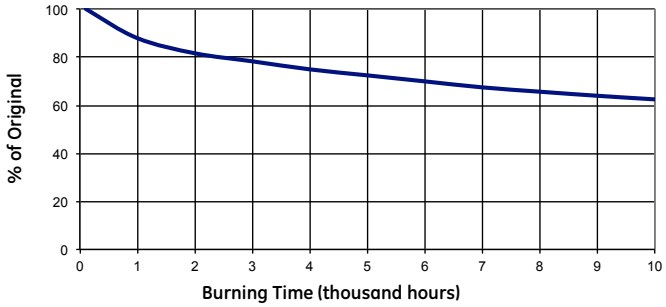


Lumen maintenance

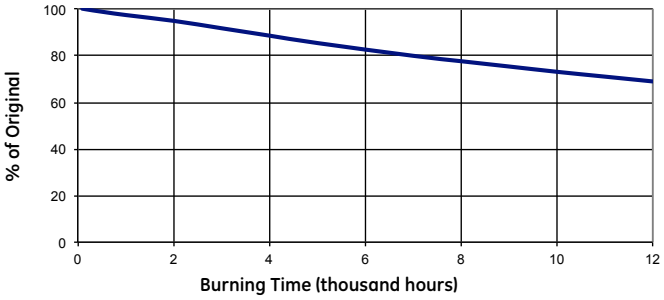
Lumen maintenance graph shows how the luminous output decreases throughout life. All metal halide lamps experience a reduction in light output and a very slight increase in power consumption through life. Consequently there is an economic life when the efficacy of the lamp falls to a level at which is better to replace the lamp and restore the illumination. Where a number of lamps are used within the same area it may be well worth considering a group lamp replacement programme to ensure uniform output from all the lamps. Curves are representing 11 hours per start cycle, less frequent starting will improve lumen maintenance.

Note: The representative curves are taken in Vertical Base Up position on ECG.

CMH 35W R-111
Lumen Maintenance



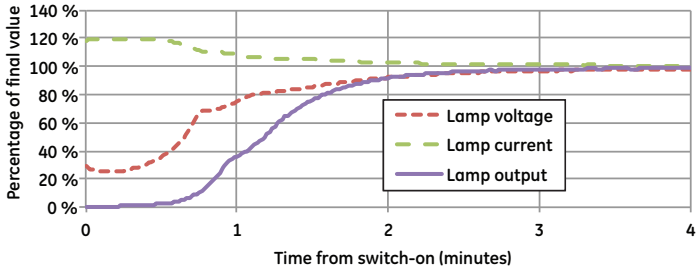
CMH 70W R-111
Lumen Maintenance



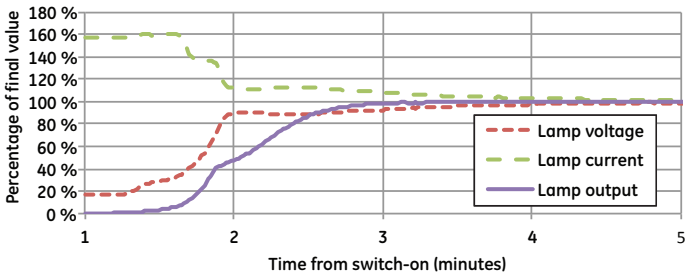
Warm-up characteristics

During the warm-up period immediately after starting, lamp temperature increases rapidly and mercury and the metal halides evaporate within the arc-tube. The lamp current and voltage will stabilise in less than 3 minutes. During this period the light output will increase from zero and the colour will approach the correct visual effect as each metallic element becomes vaporised.

35W CMH-AR111 typical warmup characteristic



70W CMH-AR111 typical warm-up characteristic



Maximum temperature

The table below shows the maximum temperatures on CMH-AR111 lamps at different positions. The values are valid for all wattages.

Location	Maximum temperature
Base	300˚C
Reflector neck	300˚C
Glare shield	400˚C

Dimming

In certain cases, dimming may be acceptable, subject to further testing. Contact your GE representative for more information. Large changes in lamp power alter the thermal characteristics of the lamp resulting in lamp colour shift and possible reduction in lamp survival.

End-of-life conditions

The principal end-of-life failure mechanism for CMH lamps is arc tube leakage into the outer jacket. High operating temperature inside the arc tube causes metal halide dose material to gradually corrode through the ceramic arc tube wall, eventually resulting at normal end-of-life in leakage of the filling gas and dose. Arc tube leakage into the outer jacket can be observed by a sudden and significant lumen drop and a perceptible colour change (usually towards green).

The above situation is often accompanied by the so-called rectification phenomena. This occurs where a discharge is established between two mount-frame parts of different material and/or mass, causing asymmetry in the electrical characteristic of the resulting discharge current. Rectification can lead to overheating of the ballast, therefore to maintain safety use electronic ballast or system which can shut itself off if ballast overheating occurs.

End-of-life cycling

A condition can exist at end-of-life whereby lamp voltage rises to a value exceeding the voltage supplied by the control gear. In such a case the lamp extinguished and on cooling restarts when the required ignition voltage falls to the actual pulse voltage provided by the ignitor. During subsequent warm-up the lamp voltage will again increase, causing extinction. This condition is known as end-of-life cycling. With electronic ballasts, cycling is unlikely. Normally cycling is an indication that lamp end-of-life has been reached, but it can also occur when lamps are operated above their recommended temperature. Lamp voltage at 100 hours life should not increase by more than 5V when operating in the luminaire, when compared to the same lamp operating in free-air. A good luminaire design will limit lamp voltage rise to 3V.

It is good practice to replace lamps that have reached end-of-life as soon as possible after failure, to minimise electrical and thermal stress on ignitor components.

UV and damage to sensitive materials

The wall of the bulb, which is produced with specially developed 'UV Control' material, absorbs potentially harmful high energy UV radiation emitted by the ceramic arc tube. The use of UV control material allows the lamp to significantly reduce the risk of discolouration or fading of products. When illuminating light-sensitive materials or at high light levels, additional UV filtration is recommended. Luminaires should not be used if the front glass is broken or missing. Although PET determines limits of human exposure to lamp UV, the risk of fading of merchandise due to UV can be quantified by a Damage Factor and a Risk of Fading. The risk of fading is simply the numerical product of the illuminance, exposure time and damage factor due to the light source.
Finally the selection of luminaire materials should take into consideration the UV emission. Current UV reduction types on the market are optimised for UV safety of human eye and skin exposure. However, luminaire materials may have different wavelength dependent response functions. Designers must take account of emission in each of the UV-A, UV-B and UV-C spectral ranges as well as material temperatures when designing luminaires.
Typical values for UV-A, UV-B and UV-C range radiation can be found in the table below.

Lamp type		35W AR111	70W AR111
UV-PET Performance			
UV-C[1]	200-280nm	0.0002	0.0001
UV-B[1]	280-315nm	0.0000	0
UV-A[1]	315-400nm	2.3044	1.2641
UVC/UVB		3.785	9.4198
UVB/UVA		0.0000	0.0000
E_{eff}[2] mW / (m^2*klx)		0.004	0.0021
PET (h)±10%		3943	7859
Risk Group	IESNA RP-27.3-96	Exempt	Exempt

[1] µW / (cm^2) / 500 Lux
[2] mW / (m^2*klx)

Information on luminaire design

Ballasts

ConstantColor™ CMH lamps are compatible with a list of approved ballasts; contact your GE representative for more information.

Containment requirement

ConstantColor™ CMH AR111 lamps may be used in open fixtures.

Control gear and accessories

Electronic ballasts

A range of GE electronic ballasts have been introduced to complement the ConstantColor™ Ceramic Metal Halide lamps. Power controlled electronic ballasts suitable for operation of Ceramic Metal Halide lamps are available from various gear manufacturers.

Advantages are:

- Good regulation against supply voltage variation
- Improved lamp colour consistency
- Elimination of lamp flicker
- Reduced weight of control gear
- Reduced electrical power losses
- Ballast noise reduced/eliminated
- Single piece compact unit
- Reduced wiring complexity in the luminaire

For selecting proper ballast for CMH lamps please see separate CMH ballasts data sheet.

Hot re-strike

All ratings re-strike within 15 minutes following a short interruption in the supply. Actual re-strike time is determined by the ignitor type, pulse voltage and cooling rate of the lamp.

Safety warnings

The use of these products requires awareness of the following safety issues:

Warning:

- Risk of electric shock - isolate from power before changing lamp.
- Strong magnetic fields may impair lamp performance.
- Do not use where directly exposed to water or outdoors without an enclosed fixture.
- Keep combustible materials away from lamp.
- A damaged lamp emits UV radiation which may cause eye/skin injury.
- Unexpected lamp rupture may cause injury, fire, or property damage.
- Use only properly rated ballast and supply voltage.
- Do not use beyond rated life

Caution:

- Risk of burn when handling hot lamp.
- Allow lamp to cool before handling.
- Do not turn on lamp until fully installed.
- Lamp may shatter and cause injury if broken.
- Do not use lamp if outer glass is scratched or broken.
- Arc tube fill gas contain Kr-85.
- Dispose of lamps in accord with local regulations.

Always follow the supplied lamp operation and handling instructions.