

# Ceramic Metal Halide Lamp Precise



## Product information

Tungsräm's low watt CMH lamps have opened new possibilities for lighting design, combining the power and light quality of far larger and less efficient lamps. It is now possible to achieve lighting design that could not be achieved previously with inferior technologies.

Tungsräm's new CMH Precise technology platform has been developed with specific focus to retail applications. Tungsräm Precise technology offers superb overall light quality, out-standing lumen maintenance, improved efficacy, while main-taining long life and reliability. These qualities are why Tungsräm is the leader in ceramic metal halide technology.

- Premium CRI
- Dramatically improved lumen maintenance
- Outstanding efficiency: 4x better than halogen
- Long life
- Robust and reliable performance
- Colour uniformity lamp to lamp
- Compact capsule

The next generation CMH lamps are the ultimate light source for retail applications where quality of light, colour and ef-ficiency are important. Now, anyone with critical colour needs can enjoy the outstanding energy efficiency and the savings that CMH lamps provide. CMH Precise lamps offer substantial benefits that make them the clear choice for specification into new stores, or into re-lamping existing store fixtures through regular replacement needs.

## Single ended format

Single ended Ceramic Metal Halide lamps are made to provide symmetrical beam distribution using the axial configuration of the discharge arc. A variety of beam angles are possible and adjustable beam control can be built into the luminaire. This compact lamp shape enables luminaire size to be minimised and the bi-pin lamp base enables easy changing with front access.

## Features

- More usable light over life, up to 33% more lumen output at end of life vs standard CMH lamps
- CMH Precise lamps offer enhanced colour rendition vs standard 3000K CMH
- Extra long life of 18,000 hours
- Extended service life and relamp cycles
- Compatible with electronic HID ballasts
- Universal burning position
- Same size as standard CMH G12, G8.5
- New 35W and 70W Precise retrofits directly into existing G8.5 and G12 fixtures, expands new sale offerings via improved lumen maintenance and colour rendering.

## Applications areas



Retail



Office



Hospitality



Showbiz



Commercial areas / city beautification  
/ architectural

# Specification summary

## Ordering Information

Description	Wattage	Colour	Product Code
CMH35/TC/UVC/U/930/G8.5 PRECISE™TU	35	3000K	93095368
CMH35/T/UVC/U/930/G12 PRECISE™TU	35	3000K	93095377
CMH70/TC/UVC/U/930/G8.5 PRECISE™TU	70	3000K	93095369
CMH70/T/UVC/U/930/G12 PRECISE™TU	70	3000K	93095378

General	Units	35W Precise 930 G8.5	35W Precise 930 G12	70W Precise 930 G8.5	70W Precise 930 G12
Product code		93095368	93095377	93095369	93095378
Nominal Wattage	[W]	35	35	70	70
Nominal Colour Temperature		3000K	3000K	3000K	3000K
Format		Single ended	Single ended	Single ended	Single ended
Bulb Type		T4.5	T4.5	T4.5	T6
Bulb Diameter	[mm]	14.5	14.5	14.5	19
Bulb Material		UVC Quartz	UVC Quartz	UVC Quartz	UVC Quartz
Bulb Finish		Clear	Clear	Clear	Clear
Arc Gap	[mm]	5.1	5.1	7.3	7.3
Base		G8.5	G12	G8.5	G12

## Operating Conditions

Burning Position	Universal	Universal	Universal	Universal
Luminaire Characteristics	Enclosed	Enclosed	Enclosed	Enclosed

### Notes:

1) Note that the lamp voltage inside the luminaire should not deviate by more than 5V from the bare lamp voltage in free air. 2) Thermal protection required.

## Electrical Characteristics

Rated lamp Power	[W]	39	39	73	73
Weighted Energy Consumption [hrs]	[kWh/1000 hrs]	42.9	42.9	80.3	80.3
Lamp Voltage	[V]	90	90	85	85
Lamp Current	[A]	0.43	0.43	0.86	0.86
Max. Ignition Voltage	[kV]	5.0	5.0	5.0	5.0
Min. Ignition Voltage	[kV]	3.0	3.0	3.0	3.0

The specification provides typical performance data for operation on most electronic ballasts. Actual values depend on ballast, supply voltage and application. CMH Precise lamps are compatible with a list of approved electronic ballasts. Contact your Tungsram representative for more information.

## Photometric Characteristics\*

100 hrs Lumens	[lm]	4,000	4,000	7,800	7,800
Chromaticity X		0.432	0.432	0.434	0.434
Chromaticity Y		0.395	0.394	0.400	0.400
Colour Rendering Index	[Ra]	89	89	90	90
Luminous Efficacy	[lm/W]	103	103	107	107
Energy Efficiency Class [EEC]		A+	A+	A+	A+

\*Photometric characteristics refer to lamp performance after 100 hours burning in vertical base up position.

## Starting and Warm-up Characteristics\*

Time to Start ( at 25 °C )	[sec.]	< 2	< 2	< 2	< 2
Time to Start - Cold Box Test at -30 °C	[sec.]	< 15	< 15	< 15	< 15
Hot Restart Time	[min.]	< 5	< 5	< 9	< 9
Warm-up Time (for 90% Lumens)	[min.]	< 2	< 2	< 2	< 2

\* Typical values (actual values are ballast and ignitor dependent).

## Through life Performance

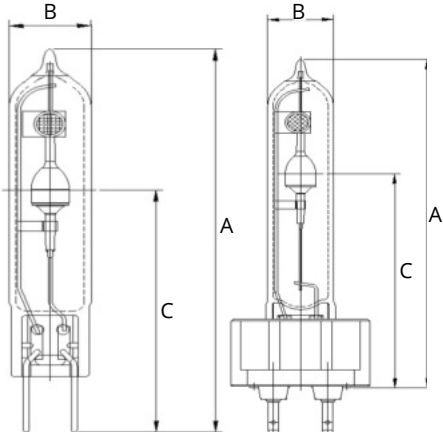
Lumen Maintenance at 40% Rated Life (Mean Lumens)	[%]	83	83	88	88
Average Rated Life	[h]	18,000	18,000	18,000	18,000
Life to 10% Failures, B10	[h]	12,000	12,000	12,000	12,000

## Maximum Operating temperatures\*

Maximum Allowed Bulb Temperature (Horizontal Orientation, Thermocouple Attached Above Burner)	[°C]	500	500	550	500
Maximum Pinch Temperature (Vertical Base up Orientation)	[°C]	300	350	300	350

\* Temperatures above which lamp performance or reliability is impaired.

## Dimensions

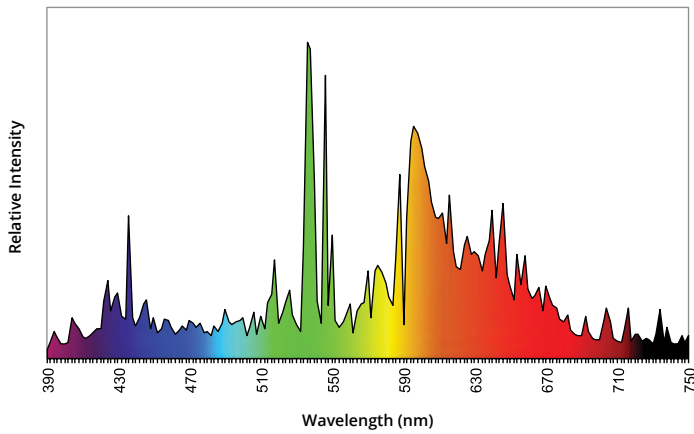


	35W G8.5	70W G8.5	35W G12	70W G12
A [mm] max.	85	85	90	90
B [mm] nominal	14.5	14.5	14.5	19
C [mm] nominal	52	52	56	56

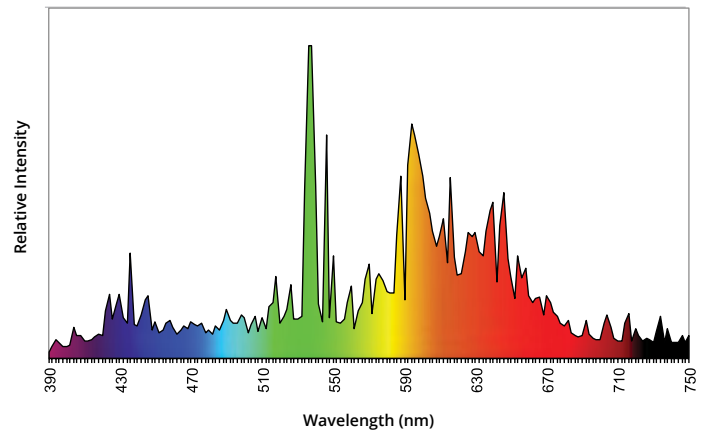
## Spectral power distribution

Representative Spectral power distribution curves are provided in the following diagrams.

CMH Precise™ 35W 930



CMH Precise™ 70W 930

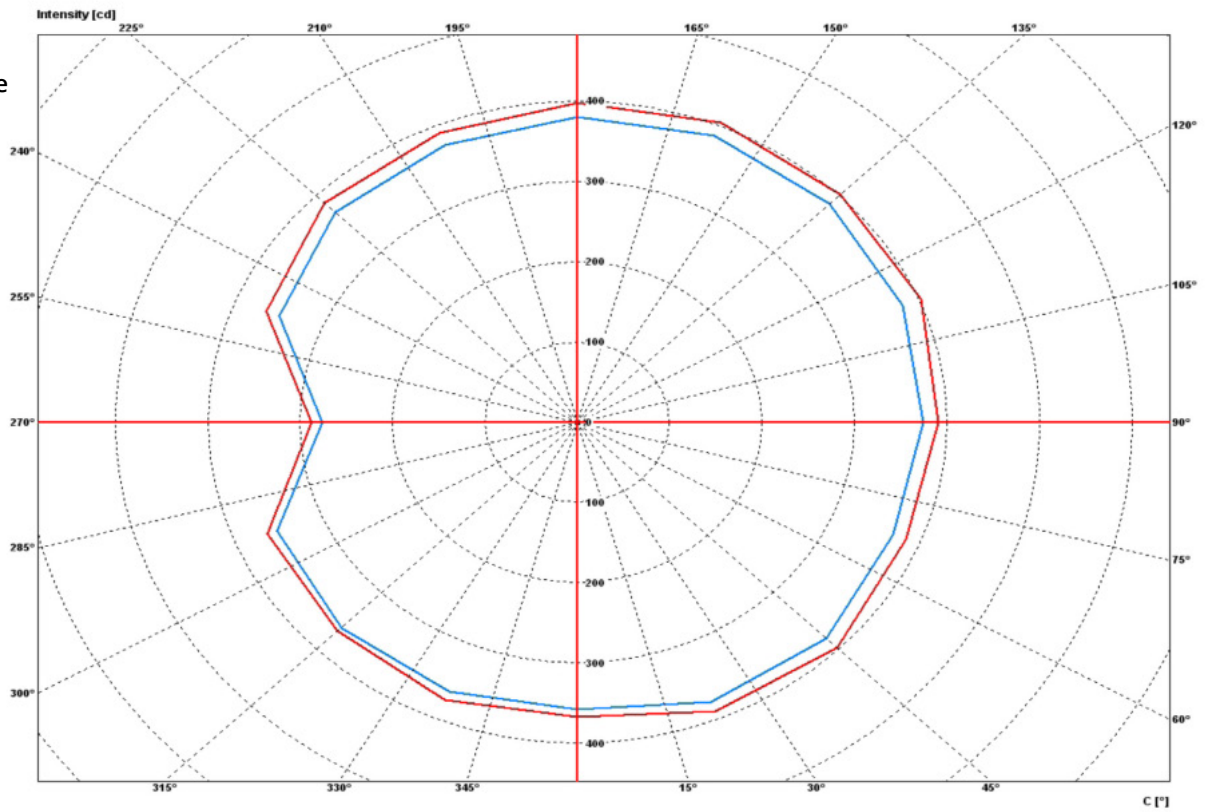


# Distribution of luminous intensity

The following diagrams show typical polar light intensity curves of the lamps in vertical base-up position

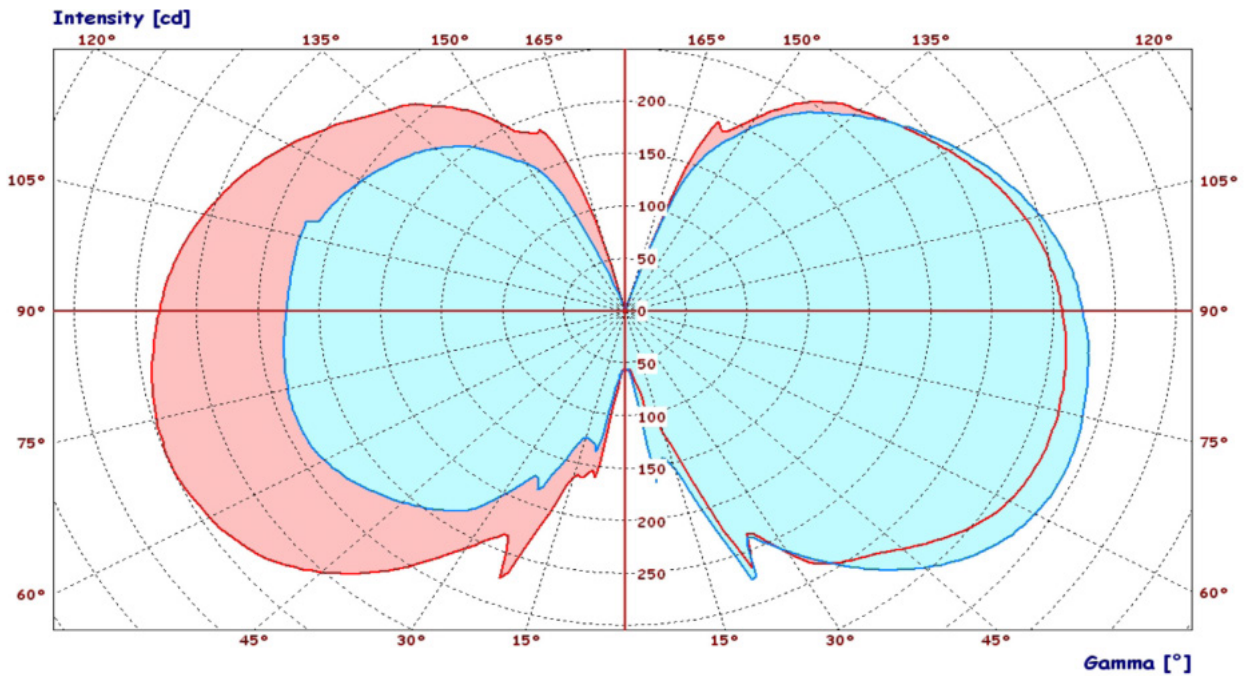
Horizontal plane polar intensity curve

CMH Precise 35W  
U 930 G12  
Imax=403cd



Vertical plane polar intensity curve

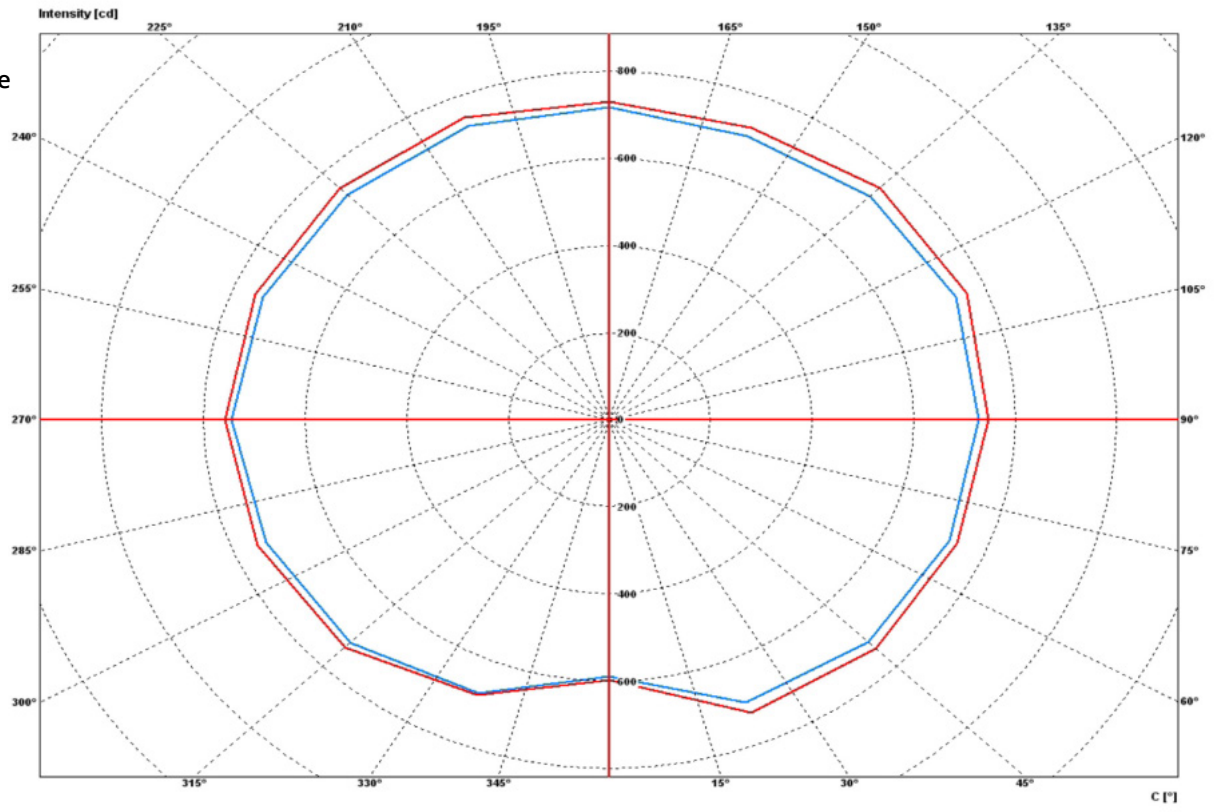
CMH Precise 35W  
U 930 G12  
Imax=403cd



C180 ——— C270 ——— C0 ——— C90 ———

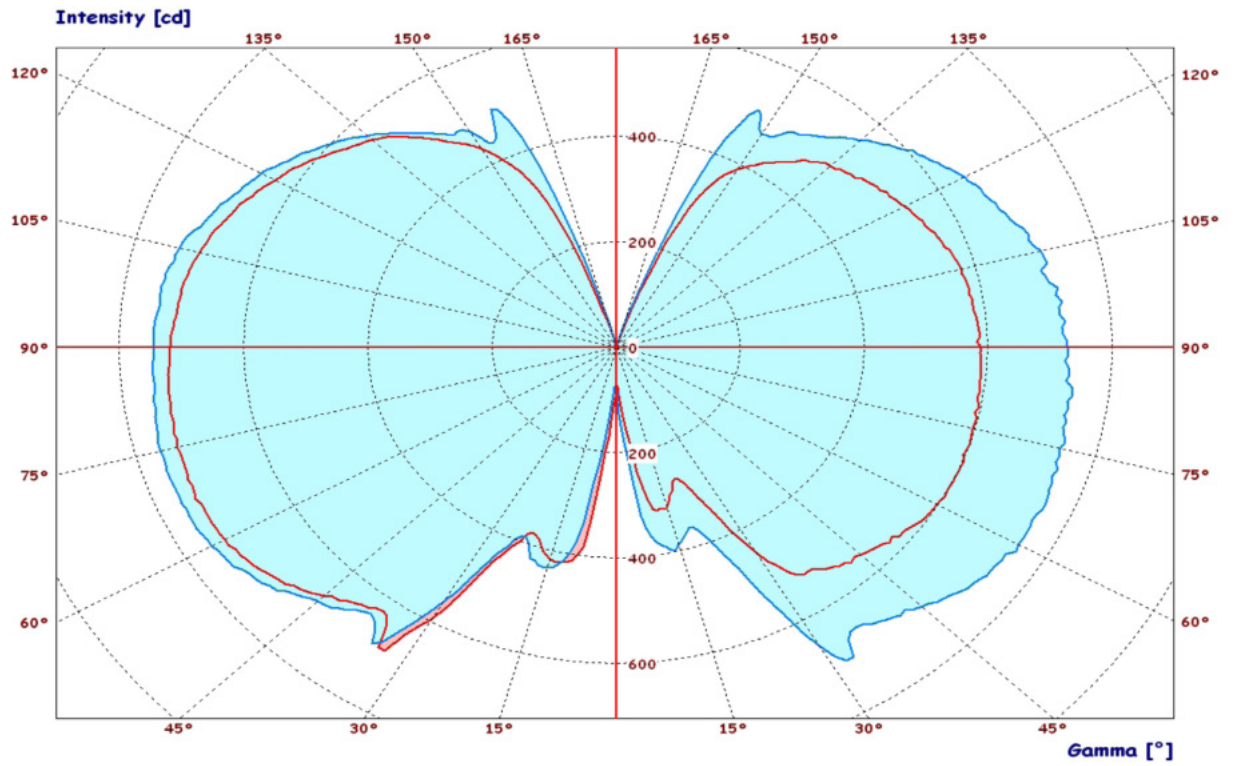
Horizontal plane  
polar intensity curve

CMH Precise 70W  
U 930 G12  
Imax=760cd



Vertical plane  
polar intensity curve

CMH Precise 70W  
U 930 G12  
Imax=760cd

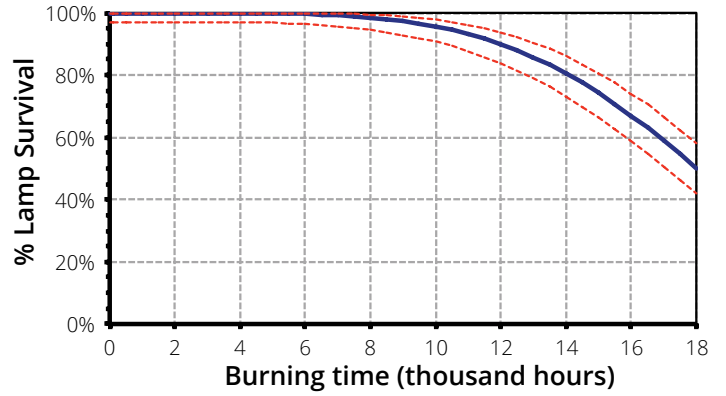


## Lamp life

Life survival graphs are shown for statistically representative batches of lamps operated under controlled nominal conditions with an 11 hours per start switching cycle. 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.

CMH Precise™ 930

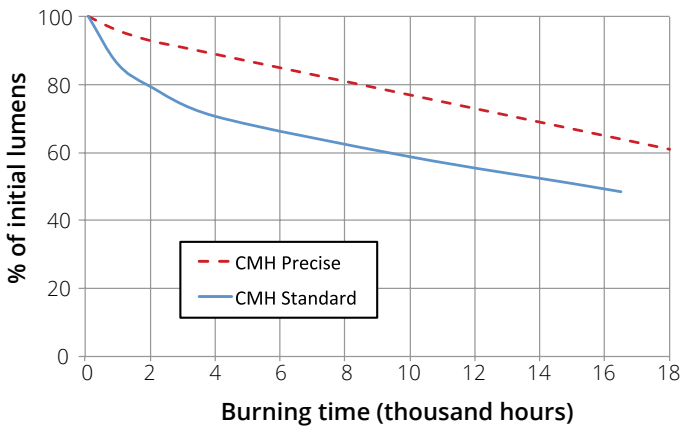


## Lumen maintenance

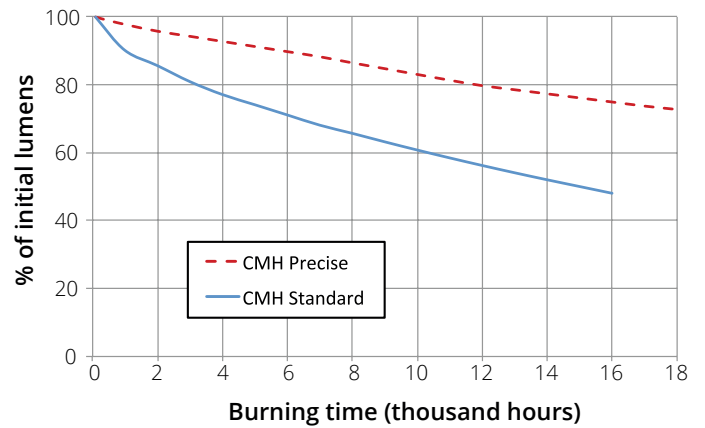
The lumen maintenance graph shows light output performance through life for statistically representative batches of lamps operated under controlled conditions with an 11 hours per start switching cycle. A common characteristic for all metal halide lamps is a reduction in light output and a slight increase in power consumption through life. Consequently there is an economic life at which lamp efficacy falls to a level when lamps should be replaced to restore design illumination levels. In areas where multiple lamps are installed, consideration should be given to a group lamp replacement programme to maintain uniform illumination levels. Curves represent operating conditions for an 11 hours per start switching cycle, but less frequent switching will improve lumen maintenance.

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

Lumen Maintenance CMH 35W Precise™ vs. Standard



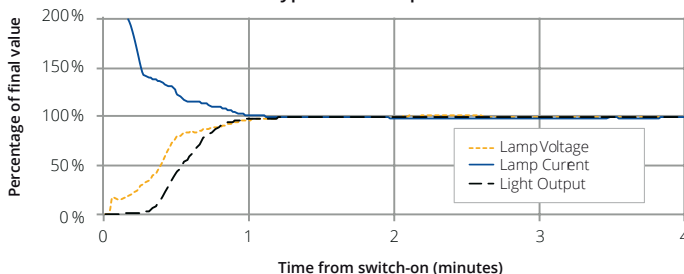
Lumen Maintenance CMH 70W Precise™ vs. Standard



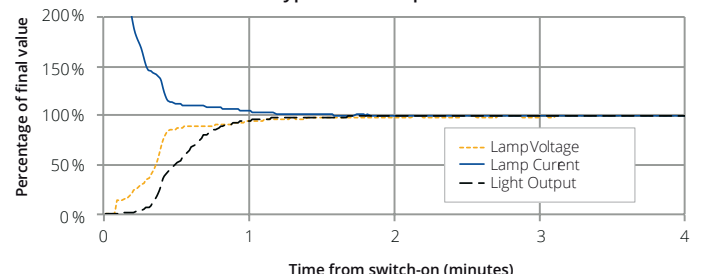
## Warm-up characteristics

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 4 minutes. During this period the light output will increase from zero and the colour will approach the final visual effect as each metallic element becomes vaporised.

35W Typical warm-up characteristic



70W Typical warm-up characteristic



## Dimming

In certain cases, dimming may be acceptable, subject to further testing. Contact your Tungsram 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. Use CMH Precise lamps only with approved electronic ballasts. Contact your GE representative for more information.

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 together with an optically neutral front glass cover 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 materials 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 Precise G8.5 & G12	70W Precise G8.5	70W Precise G12
<b>UV-PET performance</b>				
UV-C <sup>1</sup>	220-280nm	0.015	0.012	0.016
UV-B <sup>1</sup>	280-315nm	0.020	0.012	0.018
UV-A <sup>1</sup>	315-400nm	5.645	3.0	5.0
UVC/UVB		0.7598	1.0153	0.8830
UVB/UVA		0.0035	0.0039	0.0034
E <sub>eff</sub> <sup>2</sup>		0.442	0.3434	0.4468
PET (h)±10%		37.9	51	43
Risk group		Exempt	Exempt	Exempt

<sup>1</sup>  $\mu\text{W} / (\text{cm}^2) / 500 \text{ Lux}$

<sup>2</sup>  $\text{mW} / \text{klm}$

# Information on luminaire design

## Electronic ballast operation

Precise lamps have optimum performance on electronic gear.\*

This provides many advantages:

- Flicker free light output
- Well controlled electronic ignition process
- Simple wiring for fixtures due to elimination of ignitor and PFC capacitor
- Reduces fixture weight
- Automatic sensing of failed lamps and shutdown
- Lower overall system power consumption

\* For details of approved electronic ballasts for CMH lamps please consult your Tungsram representative.

## Containment requirement

CMH lamps operate above atmospheric pressure, therefore a very small risk exists that the lamp may shatter when the end of life is reached. Though this failure mode is unlikely, containment of shattered particles is required as prescribed by IEC 62035.

Single-ended lamp should only be used in a suitable enclosed luminaire with front cover glass capable of containing the fragments of a lamp should it shatter.

## Control gear and accessories

### Electronic ballasts

A range of Tungsram electronic ballasts have been introduced to complement the 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



### 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.

### Warm re-starting

The combined characteristics of ceramic arc tube material and vacuum outer jacket result in CMH lamps cooling relatively slowly. It is possible with low energy ignitors to reach the required breakdown voltage but not create a full thermionic discharge. Under these conditions the lamp can remain very warm and be prevented from cooling to a temperature at which the arc can be re-established. To avoid this, turn off the power supply for approximately fifteen minutes.



## Safety warnings

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

### Warning

- Risk of electric shock - isolate from power supply before changing lamp
- Strong magnetic fields may impair lamp performance, and in the worst case could lead to lamp shattering.

### Use in enclosed fixtures to avoid the following:

- Risk of fire
- A damaged lamp emits UV radiation which may cause eye/skin injury
- Unexpected lamp shattering may cause injury, fire or property damage

### Caution

- Risk of burn when handling hot lamp
- Lamp may shatter and cause injury if broken
- Arc tube fill gas contains Kr-85

Always follow the supplied lamp operation and handling instructions.