

## ARC LAMP

Metal Halide lamps  
Tubular Clear – 250W and 400W  
Elliptical Diffuse – 250W



### Product information

High brightness, high quality white light with good colour rendition and energy efficiency makes Tungshram Metal Halide lamps suitable for many commercial and industrial interiors, particularly in high ceiling areas.

### Application areas



Office



Industrial



Commercial Areas



Car Park

### Basic data

Product Code	Product Description	Nominal Wattage [W]	Rated Wattage [W]	Weighted Energy Consumption [kWh/1000hrs]	Volts [V]	Cap	Nominal Lumen [lm]	Rated Lumen [lm]	Rated Lamp Efficacy [lm/W]	Energy Efficiency Class (EEC)	CCT [K]	Colour Rendering Index [Ra]	Mercury Content [mg]	Ambient Temperature [°C]
<b>ARC Lamp Elliptical Diffuse</b>														
93102180	ARC250/D/UVC/VBU/960/E40 TU**	250	268	294.71	100	E40	17,000	17,080	64	A	6,000	90	13.6	25
<b>ARC Lamp Tubular Clear</b>														
93102194	ARC250/T/UVC/H/742/E40 TU**	250	271	294.89	112	E40	21,000	22,714	84	A	4,200	70	29.4	25
93102179	ARC250/T/UVC/VBU/960/E40 TU**	250	269	295.64	100	E40	19,000	19,260	72	A	6,000	90	13.6	25
93102178	ARC250/T/UVC/H/960/E40 TU**	250	272	299.58	100	E40	19,000	19,210	71	A	6,000	90	13.6	25
93102195	ARC400/T/UVC/H/742/E40 TU**	400	404	444.20	105	E40	35,000	35,270	87	A	4,200	70	29.4	25
93102247	ARC250/T/H/970/E40 TU	250	260	286	105	E40	16,000	16,000	61,5	A	7,500	90	14,3	25

Operating from suitable metal halide / high pressure sodium (HPS) ballast and metal halide ignitor. ARC lamps are only suitable for operation in fully enclosed fixtures where lens/diffuser material must be able to contain fragments of hot quartz or glass (up to 1100°C).

The lamp shall be operated only in a luminaire provided with a protective shield.

\*\*non EU product

## Dimensions

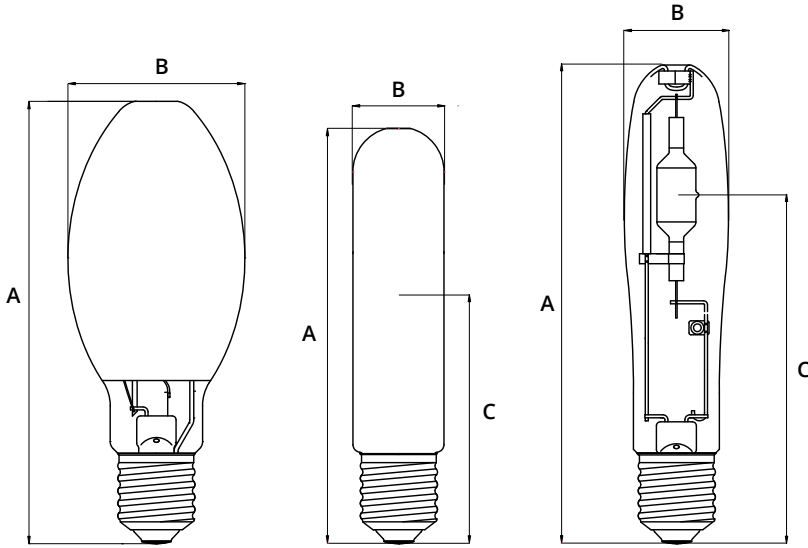


Figure 1.

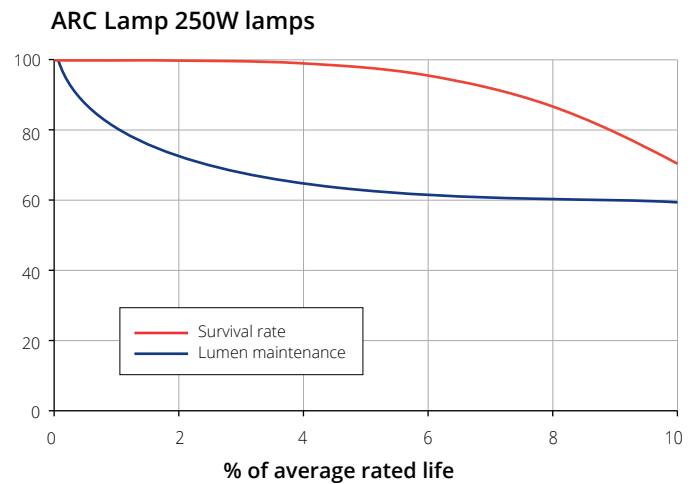
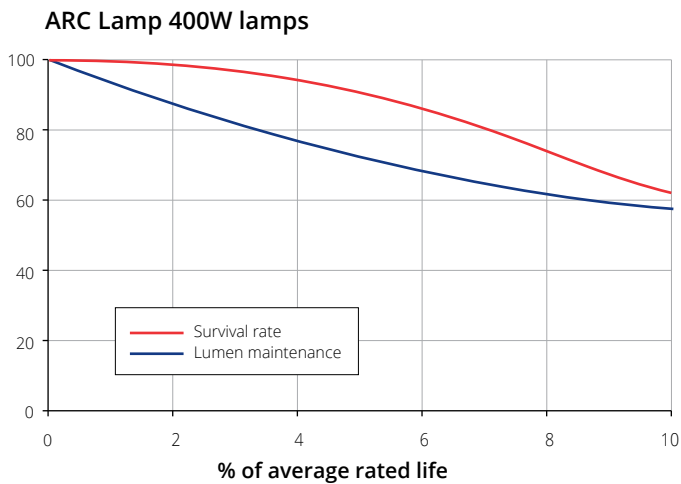
Figure 2.

Figure 3.

Product code	Wattage [W]	A Length [mm]	B Diameter [mm]	C LCL (mm)	Cap	Operating Position	Average Rated Life [h]	Bulb Glass	Mass [g]	Minimum Starting Temperature [°C]	Figure
<b>ARC Lamp Elliptical Diffuse</b>											
93102180	250	227	90	-	E40	Vertical $\pm 45^\circ$	12.000	Hard	190	-30	1
<b>ARC Lamp Tubular Clear</b>											
93102194	250	220	47	150	E40	Hor. $\pm 15^\circ$	10.000	Hard	170	-30	2
93102179	250	220	47	150	E40	Vertical $\pm 45^\circ$	12.000	Hard	170	-30	2
93102178	250	220	47	150	E40	Hor. $\pm 45^\circ$	12.000	Hard	170	-30	2
93102195	400	260	47	175	E40	Hor. $\pm 15^\circ$	10.000	Hard	190	-30	3
93102247	400	260	47	175	E40	Hor. $\pm 15^\circ$	10.000	Hard	190	-30	3

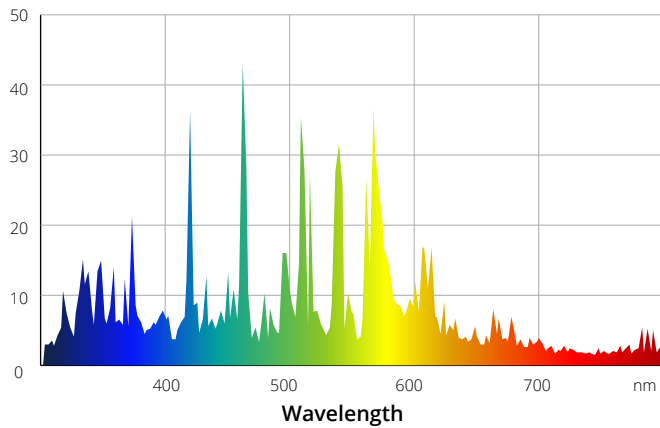
## Survival rate and lumen maintenance

The graph shows survival of representative groups of lamps operated under control conditions at 10 hours per start. Lamp life in service will be affected by a number of parameters, such as mains voltage variation, switching cycle, luminaire design and control gear. The information given is intended to be a practical guide in determining lamp replacement schedules.

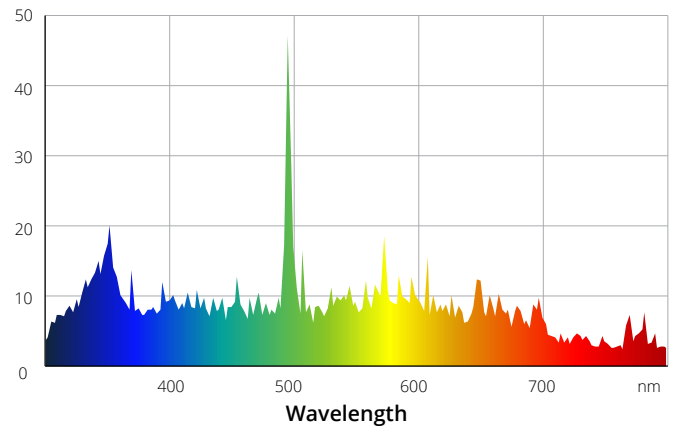


# Spectral power distribution

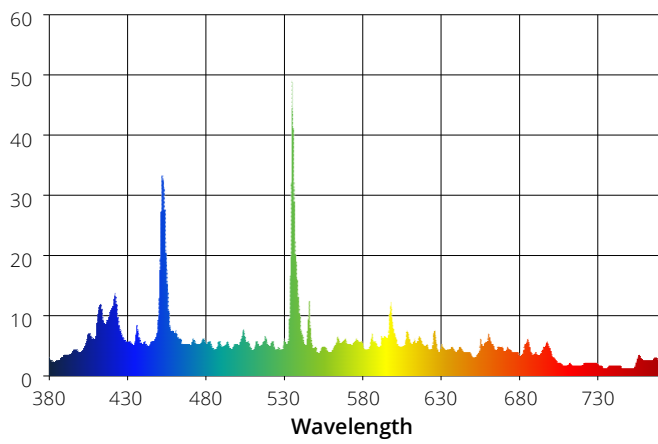
4000K natural white spectral power distribution



6000K daylight spectral power distribution



7500K spectral power distribution



## Operating note

Metal halide lamps operate with a high internal pressure and there is a slight risk that lamps may shatter, particularly if run beyond rated life. At end of life a switch off should be introduced every 24 hrs to reduce the risk of shattering. The lamp must be fully enclosed by a luminaire to ensure the retention of any fragments in the event of such failure.

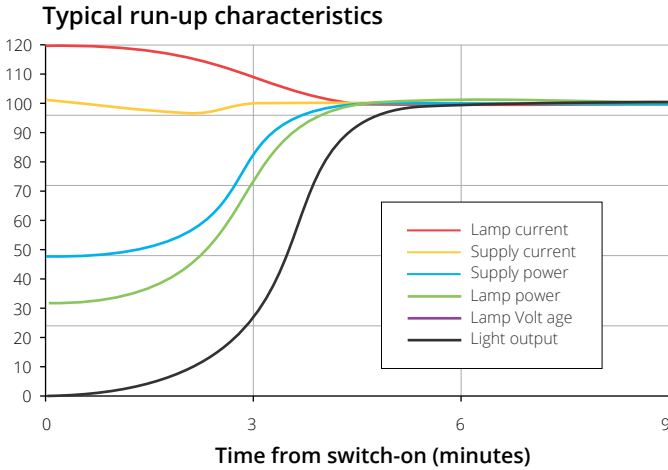
## Electrical data

Data is based on a nominal lamp operating from a nominal choke (reactor) ballast with power factor correction. Supply power is based on a typical commercially available ballast.

Wattage [W / Color code]	Volts ±15 [V]	Current [A]	Power [W]	Maximum Current Crest Factor
<b>Tubular Clear</b>				
250 / 742	112	2.75	250	1.8
250 / 960	100	3	250	1.8
250 / 970	105	3	250	1.8
400 / 742	105	4.35	400	1.8
<b>Elliptical Diffuse</b>				
250 / 740	112	2.75	250	1.8
250 / 960	100	3	250	1.8

## Run-up characteristics

The graph shows typical run-up characteristics. Time for the light output to reach 90% of the final value is determined by supply voltage and ballast design.



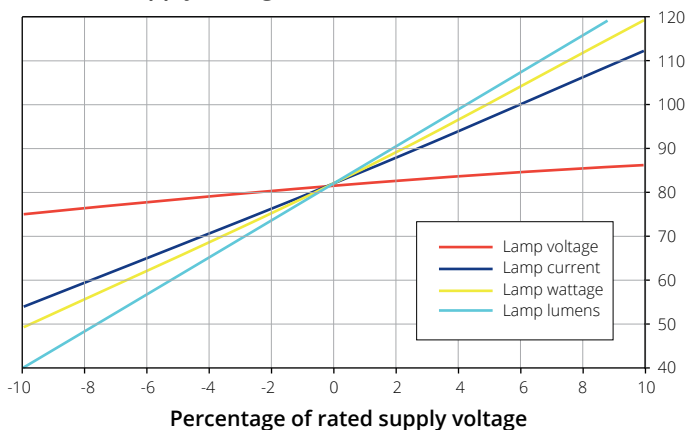
## Hot re-strike time

All ratings re-strike within 7 minutes following a short interruption in the supply. Actual re-strike time is determined by ignitor type, pulse voltage and cooling rate of the lamp.

## Supply voltage

250W and 400W lamps are suitable for supplies in the range 220V to 250V; 50/60Hz for appropriately rated series choke (reactor) ballasts. Supplies outside this range require a transformer (conventional, high reactance or CWA) to ensure correct lamp operation. Lamps start and operate at 10% below the rated supply voltage when the correct control gear is used. However, in order to maximise lamp survival, lumen maintenance and colour uniformity the supply voltage and ballast design voltage should be within  $\pm 3\%$ . Supply variations of  $\pm 5\%$  are permissible for short periods only. This may be achieved by measuring mean supply voltage at the installation and selecting ballasts with appropriate settings.

**Effect of supply voltage variation**



## Control gear

There are no international standards for metal halide lamps of this type. It is therefore important to check the compatibility of lamp and control gear. Detailed information is given in this data sheet under "Guidance for luminaire manufacturers". It is essential to use a ballast appropriate to the supply voltage at the luminaire. Typical wiring diagrams for control circuits incorporating a "Superimposed" or "Impulser" ignitor and choke (reactor) ballast are shown. Refer to actual ballast and ignitor manufacturer's data for terminal identification and wiring information.

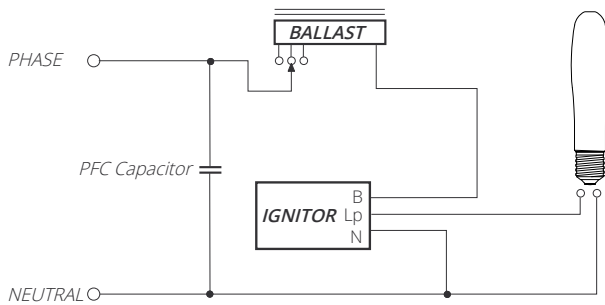
## Fusing of circuits

A number of factors need to be taken into account when selecting the rating and characteristic of the supply line fuse/MCB:

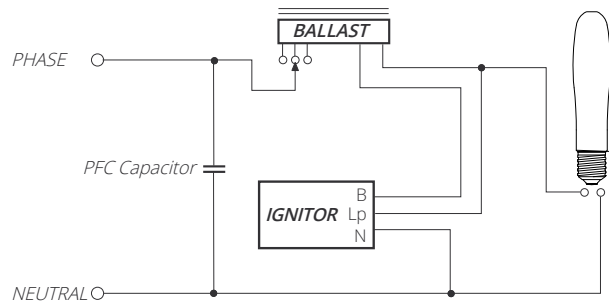
- (a) At the instant the circuit is switched-on, PFC capacitor current can be many times the steady state value for a very short period (few hundred microseconds).
- (b) For a short period (few seconds) after switch-on all discharge lamps may act as a partial rectifier and as a result the ballast can allow several times the normal supply current to flow.
- (c) During the lamp run-up period supply current is higher than normal (see graph).

Watts	1	2	3	4	5	6
<b>Tubular Clear</b>						
250	10	16	16	20	20	20
400	16	20	20	25	25	32
<b>Elliptical Diffuse</b>						
250	10	16	16	20	20	20

Typical superimposed ignitor circuit



Typical impulser ignitor circuit



## Guidance for luminaire manufacturers

### Lamp operating temperature limits

Maximum Cap Temperature:	250°C
Maximum Bulb Temperature:	450°C

### Control gear

To achieve correct lamp starting, performance and life it is important that lamp and control gear are compatible and suitably rated for the supply voltage at the luminaire.

### Ballasts

Lamps are fully compatible with ballasts manufactured for high pressure sodium lamps to IEC60662 and for metal halide lamps to IEC61167. Enhanced performance can be achieved by using special ballasts to the specification shown below. Ballasts should comply with specifications IEC61347-1 and IEC60923. Series choke (reactor) ballasts should have characteristics close to the following values:

Supply Voltage	220V	230V	240V	250V
<b>Tubular Clear 250W</b>				
Impedance at 3A (ohms)	60	64	67.7	71.3
Based on Cold				
Watts loss (W)	24	25	26	27
<b>Tubular Clear 400W</b>				
Impedance at 4.6A (ohms)	39.6	42	44.4	46.7
Based on Cold				
Watts loss (W)	32	34	36	38
<b>Elliptical Clear &amp; Coated 250W</b>				
Impedance at 3A (ohms)	60	64	67.7	71.3
Based on Cold				
Watts loss (W)	24	25	26	27

## Ballast thermal protection

Use of ballasts incorporating thermal cut-out is not a specific requirement but is a good optional safety measure for the installation.

## Ballast voltage adjustment

Series choke (reactor) ballasts incorporating additional tappings at  $\pm 10V$  of the rated supply voltage are recommended. Alternatively a single additional tapping 10V above the rated supply voltage will ensure lamps are not overloaded due to excessive supply voltage.

## Ignitors

Both Superimposed and Impulser type ignitors are suitable. It is recommended that only Tungfram approved ignitors are used. Ignitors should comply with specifications IEC61347-2 and IEC60927 and have starting pulse characteristics as follows:

Watts	Min Pulse Voltage (kV) <sup>1</sup>	Max Pulse Voltage (kV) <sup>2</sup>	Min Pulse Width ( $\mu$ s) <sup>3</sup>	Min Pulse Repetition Rate <sup>4</sup>	Min HF Peak Current [A]
250	3.5	5	>0.3	3 / half cycle	>1
400	3.5	5	>0.3	3 / half cycle	>1

1. When loaded with 100 pF.

2. When loaded with 20pF.

3. At 90% peak voltage.

4. From ignitor into lamp during starting.

## Timed ignitors

Use of a "timed" or "cut-out" ignitor is not a specific requirement, but it is a good optional safety feature for the installation. The timed period must be adequate to allow lamps to cool and restart when the supply is interrupted briefly (see "hot re-strike time"). A period of 5 minutes continuous or intermittent operation is recommended before the ignitor is automatically switched off. Commercially available 10/11 minute timed ignitors are suitable.

## Cable between ignitor and lamp

Cable connected between the lamp and a superimposed ignitor "Lp" terminal, or the ballast when using an impulser ignitor, must be rated at a minimum 50/60Hz voltage of 1000V. Mineral insulated cable is not suitable for connecting the lamp to the control gear. To achieve good starting superimposed ignitors must be adjacent to the luminaire. Cable capacitance of wiring between the ignitor "Lp" terminal and the lamp should not exceed 100pF (<1 metre length) when measured to adjacent earthed metal and/or other cables, unless otherwise stated by ignitor manufacturer. When using impulser type ignitors longer cable lengths between ballast and lamp are normally permissible. Limits for particular ignitors are available on request from Tungfram Lighting or directly from the ignitor manufacturer.

## PFC capacitors for simple choke circuits

Power Factor Correction is advisable in order to minimise supply current and electricity costs. For 220-250V supplies 250V $\pm$ 10% rated capacitors are recommended as follows:

	250W	400W
<b>Tubular Clear</b>		
PFC Capacitor	30 $\mu$ F	40 $\mu$ F
<b>Elliptical Diffuse</b>		
PFC Capacitor	30 $\mu$ F	-