



## LAMP PROBLEMS:

Once the environment the lamp is mounted and operates in has been thoroughly examined, and any problems have been properly rectified, then the lamp itself can be further examined as a cause for failure. Following is a list of lamp failures and the related causes.

A dis-colored bulb indicates a failure of one of the seals. The cause of the failure can be attributed to many factors. The most common cause for a failure is overheating or uneven cooling of the lamp that results in abnormal thermal stress of the seal area that eventually weakens the seal materials or quartz body itself, and leads to a seal failure. A second cause in the same area is mechanical stress when installing, mounting, or handling the lamp, which stresses and eventually weakens the seal area, resulting in a seal failure. Very uncommon, but possible, can be defects in construction or materials, but this scenario is usually discovered during initial lamp testing, or happens very quickly in the service life.

### Seal failure indications:

A rapid seal failure will quickly result in a blue-yellow discoloration of the bulb envelope, or worse a catastrophic failure of the quartz body. In rare cases, the fill nipple may fail, allowing instant contamination of the lamp. At the same time, the operating current level of the lamp will also dramatically increase as the internal gas mixture changes due to air infiltration.



Here is what's happening inside:



A gradual and even blackening of the lamp envelope, and the reduced output of light usually indicates a slow seal failure.



Re-check the cooling system to make sure the airflow is proper, unrestricted, and directed properly. Over-heating of the lamp is the primary cause of seal failures. In addition, make sure the method of mounting the lamp does not induce physical stress on the lamp



while operating. This to will loosen a seal, and lead directly to a seal or body failure.

Small darkened areas of the envelope usually indicate Over Current, Electrode failure, bad stabilization, or the need for rotation of the lamp over it's rated life. This is usually the first sign of bulb aging and/or a developing problem.

As the Lamp reaches the end of it's warranted life period, some degradation of many components of the lamp is to be expected, and the luminous output will begin to fall off. This is normal as the bulb ages. By the time the bulb has exceeded it's rated life by 25%, the bulb should be taken out of service if not already done so.

Damage to the Electrodes is caused by variety of problems, all usually related to the power supply or electrical connections. Depending on the severity of the problem, lamp life and performance will either gradually or rapidly deteriorate, as well as the development of arc instability.

## TYPICAL ELECTRODE PROBLEMS/SYMPTOMS:

**CATHODE:** The smaller end usually only suffers damage from specific problems caused by the power supply. Most commonly, the pointed end will "mushroom" or deform due to excessive current set by the operator, excessive ripple in the DC output of the power supply, or excessive ignition strikes.



Reversed polarity of the DC connections will also quickly cause a melted cathode



**ANODE:** The larger electrode suffers the brunt of the Electrode related problems, as it is on the receiving end of the arc flame. Proper evaluation of the damage can typically identify the problem, or at least simplify the analysis. When excessive ripple is present in the DC input, the result will be



a visible flicker in the flame caused by arc instability. If present for long periods, both damage to the Anode face, as well as build-up of deposits in a dual or triple pattern will cause arc-flame deflection and flame wander. Once the damage occurs, the lamp will not return to a steady state. This is the most common type of lamp problem.



Incorrect current outside the lamp's rating will also damage the anode by the flame literally blasting the anode material away, or leaving deposits due to incorrect operating temperature.



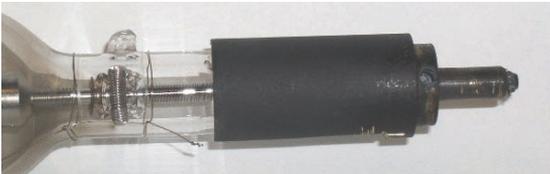
Lamp position and/or incorrect magnetic stabilization will also affect the lamp. If the lamp is operated at an excessive angle, the flame will drift away from the center of the anode, and leave deposits that will lead to flicker. In the same principle, if there is missing or incorrect magnetic stabilization, the flame will react in the same manner, drifting away from the center and leaving deposits that will permanently cause flame instability.



Dis-Colored End Fittings are the result of improper cooling / lamp overheating, or in rare cases, the reflector focusing the light on the lamp end. Mild over-heating will turn the fittings a blue color.



While excessive overheating will turn the end caps black, and cause the seal underneath to fail. In extreme cases, the danger of explosion is present.



Explosion – A Catastrophic failure of the bulb is the most uncommon, yet most spectacular failure that occurs. The reasons this phenomena occur are usually very specific, including drastic overheating, a high amount of mechanical stress on the bulb, oil and dirt on the quartz body of the lamp, or excessive over-current of the lamp leading to internal component failure. In addition, running the lamp past the recommended life span of the lamp will increase this risk considerably.



## CONCLUSION

A Hard-Starting Lamp can have many causes, either the lamp itself, or within the projection system. External of the lamp, problems typically originate with the power supply, igniter, and DC cabling. These areas are covered in the Projection system trouble-shooting section. From the lamp end, a hard-starting lamp usually indicates either an internal problem, or the lamp has reached the end of its useable life. Refer to this guide to try to find the exact problem, as well as to check the hours and number of strikes on the lamp to determine its age and life span.