

HID TROUBLESHOOTING GUIDE

GENERAL INFORMATION

The high intensity discharge (HID) family of lamps currently includes mercury, metal halide and high pressure sodium lamps. To determine the possible cause of problems with HID installations a thorough analysis must be made of all operating conditions. It therefore becomes important that lighting personnel become familiar with the indications of trouble and know the methods used to correct the problems.

Light is produced in a HID lamp by an electric arc struck between two main electrodes located within the arc tube. The mercury and metal halide lamps also have a starting electrode located at one end of the arc tube to assist in lamp starting. The high pressure sodium lamp does not contain this starting electrode. High pressure sodium lamps are started by a high voltage starting pulse applied across the lamp arc tube. These devices are called “starters” or “ignitors.”

HID lamps must be operated with a ballast. A ballast is required to limit the current and to provide proper starting and operating voltage for the lamp.

NORMAL END OF LAMP LIFE

The key item to consider in regards to average lamp life is to remember that it is an average and that not all lamps will be operative at the end of the rated life. Some lamps will fail prior to rated life and others will exceed the rated life.

Mercury Lamps — Normal end of life of a mercury lamp is exhibited by blackening at the ends of the arc tube and electrode tip deterioration. This failure mode very often results in a reduction in light output, rather than in a lamp outage.

Metal Halide Lamps — The normal end of a metal halide lamp is caused by sodium loss from the arc tube. The metal halide lamp (BD & BU) when burned vertically 510° will display pinkish color characteristics at end of life. The GE I-Line will develop a bluish color characteristic and becomes a hard starter.

High Pressure Sodium Lamps — The normal evidence of end of life for a high pressure sodium lamp is on-cycling. This results when an aging lamp requires more voltage to stabilize and operate than the ballast is able to provide. When the lamp's rising voltage exceeds the ballast output voltage the lamp extinguishes. Then, after a cooling down period of about a minute, the arc will restrike and the cycle begins again.

HID LAMP WILL NOT START

POSSIBLE CAUSES	CORRECTIVE MAINTENANCE
LAMP LOOSE IN SOCKET	Screw lamp firmly into socket until good contact is made. Excess torque may cause the lamp to shatter at neck. If the socket is burned or distorted, or the lamp will not seat properly, replace the socket.
NORMAL END OF LAMP LIFE	Replace the inoperative lamp.
INCORRECT LAMP	Check and compare data on ballast or fixture nameplate with lamp characteristics. If lamp is 150 watt HPS check arc tube voltage of lamp to ensure compatibility with ballast. Two types are 55V and 100V.
IMPROPER LAMP OPERATING POSITION (Metal Halide only)	The operating position should agree with the lamp etch style numbers. A BU-HOR lamp can be operated base up vertical to and including the horizontal and a BD can be operated base down vertical to, approaching, but not including the horizontal. A lamp operated beyond the specified position may not start.
END OF BALLAST LIFE	Check for charred spots and/or swollen capacitors. Replace defective ballast and components.
PHOTO-ELECTRICAL CONTROL INOPERATIVE	Test with power on, cover photocell. Wait the few minutes generally required for an operative photocell to apply power to the fixture. Replace if inoperative.
SUPPLY VOLTAGE TO FIXTURE OR BALLAST IS TOO LOW	Check supply voltage and ballast-output voltage. Do not measure an HPS lamp-output voltage without disconnecting the starting circuit. High voltage starting pulse can damage commonly used multi-meters.
HPS STARTER FAILURE	Isolate problem. Try known good lamp...if lamp will not start. Replace starter.
AMBIENT TEMPERATURE TOO HIGH OR TOO LOW FOR BALLAST	Check ballast specifications. Indoor and outdoor specifications differ with respect to ambient operating temperature ranges.
DEFECTIVE OR IMPROPER WIRING	Examine wiring to ensure it agrees with wiring diagrams on ballast label. Check connections to see that they are secure. Check primary wiring to and from ballast to lamp to establish continuity. Check 2 lamp ballasts to verify series or parallel operation. If one lamp is burned out in a series circuit the second lamp will not operate. Replace one or both lamps.
INCORRECT BALLAST	Check ballast nameplate data to ensure correct voltage, wattage, and lamp type is compatible with lamp being used.

HID LAMP WILL NOT START

POSSIBLE CAUSES	CORRECTIVE MAINTENANCE
DEFECTIVE OR IMPROPER WIRING	Examine wiring to ensure it agrees with wiring diagrams on ballast label. Check connections to see that they are secure. Check primary wiring to and from ballast to lamp to establish continuity. Check 2 lamp ballasts to verify series or parallel operation. If one lamp is burned out in a series circuit the second lamp will not operate. Replace one or both lamps.
INCORRECT BALLAST	Check ballast nameplate data to ensure correct voltage, wattage, and lamp type is compatible with lamp being used.
DEFECTIVE LAMP	Visual inspection, try a known operative lamp. Replace lamp.
BLOWN FUSE	Many HID fixtures are individually fused. Check and replace fuses.

SUPPLY VOLTAGE TO FIXTURE IS TOO LOW	Check both supply and ballast output voltage with lamp operating.
INCORRECT BALLAST	Check and compare data on ballast and fixture nameplate with lamp electrical characteristics. Check multi-tap ballast to ensure correct connection.
HIGH OPERATING VOLTAGE	Check lamp voltage at the socket terminals while operating.
LOW BALLAST OUTPUT VOLTAGE	Check ballast output and supply volts without a lamp in the circuit.
VOLTAGE VARIABLE	Use recording voltmeter to determine degree and duration of voltage fluctuations. Check for other loads on lighting circuit. Remove lighting from circuits with large electrical loads.
POOR ELECTRICAL CONNECTIONS	Check wiring and lamp contact with socket.
HIGH SPIKE LAMP	Chemistry of a defective lamp sometimes causes the lamp to call for more voltage than the ballast can deliver and the lamp will extinguish. Cool and repeat the cycle. Replace lamp.

LAMP STARTS SLOWLY

SUPPLY VOLTAGE TO FIXTURE IS SLOW	Check both supply and ballast output voltage with lamp operating.
LOW BALLAST OUTPUT VOLTAGE	Check both ballast output and supply volts without lamp in the circuit.
LAMP IS A HARD STARTER	Replace lamp if other system components are OK.

SHORT LAMP LIFE

INCORRECT LAMP	Check and compare data on ballast and fixture nameplate with lamp electrical characteristics.
SHORTED LAMP	Check electrically for a shorted ballast. If defective, replace.
INCORRECT LAMP OPERATING POSITION	Check lamp operating specifications for BU (Base up) or BD (Base down) operation. Use only as specified.
LAMP DAMAGE	Investigate possibility of outer bulb damage, particularly where glass meets base. Lamps may have been twisted too firmly into socket. Look for broken arc tubes or loose metal parts. Replace lamp. Investigate vibration problems.
OVERWATTAGE OPERATION	Check ballast date for lamp type and wattage. Check operation for correct voltage and current at socket terminals.
OVERHEATED ARC TUBE	Possibly caused by the reflector focusing heat energy back onto arc tube. Repositioning the lamp in the reflector may correct the condition.

BLOWN FUSES

HIGH MOMENTARY LINE CURRENT DURING TURN ON	Check ballast literature for recommended rating of circuit protective devices. Circuit protective devices should have time delay feature when used with reactor or auto transformer ballasts.
OVERWATTAGE OPERATION	Check ballast and fixture rating for lamp type and wattage. Compare with recommended fusing.
OVERLOADED CIRCUIT	Check total load on circuit. Lamps and ballast plus other connected equipment. Rewire to accommodate starting current of lamp ballast combination.
INCORRECT FUSE SIZE	Select correct fuse and rating from manufacturers suggested fusing data.

LAMP LIGHT OUTPUT LOW

POSSIBLE CAUSES	CORRECTIVE MAINTENANCE
LAMPS NEAR END OF LIFE	Check burning time. If near end of life, replace lamp.
SUPPLY VOLTAGE TO FIXTURE IS LOW	Check both supply and ballast output voltage with lamp operating.
LOW BALLAST VOLTAGE	Check ballast output and supply volts without lamp in circuit.
VARIABLE VOLTAGE	Use recording voltmeter to check degree and duration of voltage fluctuation. Check to determine other electrical loads on lamp circuit. Remove lighting circuit from other lines with large electrical loads.
INCORRECT BALLAST	Check ballast nameplate to verify rating conforms with lamp rating description. Check multi-tap ballast to ensure correct connection.
DIRT ACCUMULATION	Reflector and/or lamp may have excessive dirt accumulation. Check and clean luminaire. Establish maintenance program.

BLACKENED ARC TUBE

INCORRECT BALLAST	Check and compare data on ballast and fixture nameplate with lamp electrical characteristic.
PARTIALLY SHORTED BALLAST	Check electrically for shorted ballast. Check multi-tap ballast to ensure correct tap is utilized.
OVERWATTAGE OPERATION	Check ballast and fixture rating for lamp type and wattage. Check operation for correct voltage and current at socket terminals.
OVERHEATED ARC TUBE	Possibly caused by reflector focusing heat energy back onto the arc tube. Repositioning the lamp in the reflector may correct the condition. Check for shorted capacitors.

ABNORMAL LAMP COLOR DIFFERENCE

LOW SUPPLY VOLTAGE	Check supply voltage and ballast output voltages with lamp operating.
LOW BALLAST OUTPUT VOLTAGE	Check ballast output and supply volts without lamp in circuit.
OVERHEATED ARC TUBE	Possibly caused by reflector focusing heat energy back onto the arc tube. Repositioning the lamp in the reflector may correct the condition.
VARIATION IN LIGHT DISTRIBUTION	Check luminaire. To test interchange lamps between suspected and normally performing luminaires.
DIRT ACCUMULATION	Clean luminaries and lamps.
ILLUMINATION COLOR DIFFERENCES	Variations in environment colors, walls, ceilings, etc. and cause illumination color illusions.
MIXTURE OF LAMP TYPES	Check lamp type. Replace if incorrect type.
OF DIFFERENT MANUFACTURER	If color shift is an important consideration, replace lamps with all of one manufacturer.
RANGE OF MANUFACTURING TOLERANCES	Metal halide lamps in particular tend to have some color differences due to the normal manufacturing process. Phosphor coated lamps will reduce the color shift to some degree but the problem will not be eliminated.
AGING PROCESS	A slight color shift occurs as HID lamps age. Spot replacement of failures with new lamps may show very noticeable differences in lamp colors. Group lamp replacement minimizes this problem.