

Figure 5.1 Schematic diagram of a fluorescent lamp operated using a choke ballast and a switch start

The choke ballast is made from a large number of windings of copper on a laminated iron core. It works on the self-inductance principle and is designed so that impedance of the choke limits the current through the circuit to the correct value for a given lamp and supply voltages. A range of ballasts is available for different lamps and different voltages. Also the ballast design has to be changed if it is to operate at a different mains supply frequency.

To start the lamp it is common to use a glow starter. The glow starter switch consists of one or two bi-metallic strips enclosed in a glass tube containing a noble gas. The glow starter is connected across the lamp so it is possible for a current to pass through the ballast, through the electrode at one end of the lamp, through the electrode at the other end of the lamp and back to neutral. When the mains voltage is first applied to the lamp circuit, the total mains voltage appears across the electrodes of the starter and this initiates a glow discharge. This discharge heats the bi-metallic elements within the starter and as the electrodes heat up they bend towards each other until eventually they touch. While the electrodes are touching the current passing through the lamp electrodes pre-heats them. While the electrodes in the starter are touching there is no glow discharge and so the electrodes cool and separate. At the moment that the electrodes come apart the current through the ballast is interrupted causing a voltage peak across the lamp. *Note:* the glow starter does not always create the conditions for the lamp to start and sometimes the starting cycle has to be repeated a number of times. Figures 5.2 to 5.4 illustrate the starting process.

Figure 5.2 The heat from the discharge in the starter causes the bi-metallic electrodes to bend together

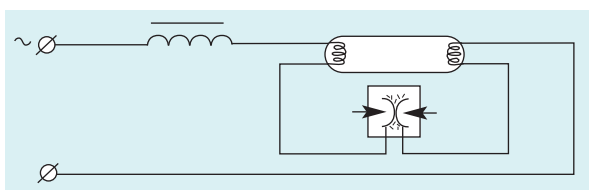


Figure 5.3 The bi-metallic electrodes touch and a current flows through the circuit preheating the electrodes of the lamp

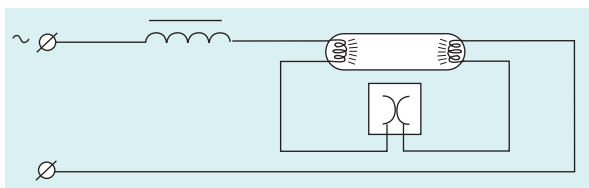


Figure 5.4 The electrodes cool and separate, causing a voltage peak which ignites the lamp

