

Reducing Infra-Red Radiation in Mercury Vapour Lamps

Metallising preparations, comprising solutions of the resins or sulpho-resins of platinum and other noble metals in essential oils, are widely used in the decoration of glassware and glazed ceramic. The preparation is normally applied by brushing, after which the ware is fired in a slightly oxidising atmosphere. The firing temperature depends on the nature of the ware; soda-lime glass is normally fired at about 550°C, while glazed ceramic may be fired at up to 800°C. During firing the essential oils are burnt away, the resins and sulpho-resins decompose and a bright, adherent film of metal is left behind on the ware.

For some time these preparations have been attracting the attention of the industrial user, since they offer the means of providing reflecting surfaces on such materials as glass and quartz that withstand high temperatures in service without tarnishing and which are so strongly adherent that they cannot be damaged by handling. One of these industrial applications is in the manufacture of specialised electric lamps such as the ME/D series of mercury vapour lamps produced by the British Thomson-Houston Co. Ltd. Unlike the normal mercury vapour lamps, which generally have an arc loading of 10–30 watts per cm. of arc length and which consequently have a very long light source, the ME/D series have an arc loading of over 250 watts per cm. of arc length. This produces an extremely compact light source that is ideal for optical instruments such as projection microscopes.

For efficient operation at such high arc loading it is essential that the pressure of mercury vapour should be kept as high as possible. Since this pressure is a direct function of temperature the lamp must be run as hot as possible. Those areas of the

envelope that are likely to run coldest are therefore treated with a platinum-gold metallising preparation that deposits one of the most lustrous films obtainable by this technique. This ensures that a large proportion of the infra-red output of the mercury vapour arc is reflected back into the lamp.

Firing is not carried out in an oven, as is the practice in decorative metallising. The preparation is applied to the quartz after sealing and the lamp is then run for a time during which the quartz envelope reaches a sufficiently high temperature to “fire” the preparation and produce the film. In service parts of the quartz reach temperatures as high as 800°C, but the platinum-gold alloy remains unaffected, except for a slight loss of gold over a long period due to evaporation.



A Mazda box-type mercury vapour lamp, showing the platinum-gold films fired on to the quartz envelope