

THERMIONIC CATHODES MANUFACTURING

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ABSTRACT

A thermionic (dispenser) cathode is an electron source commonly used in Vacuum Electronic Devices (VED). Its operation is based on principals of thermionic emission, and while the physics of the thermionic emission is well understood and described, the cathode's performance depends on many factors, including but not limited to materials' purity and properties, manufacturing process control, facility cleanliness and environmental controls, and most importantly operators' skills. Since the cathodes cannot be tested for performance before being installed into electron guns (or a specially designed test equipment), it is critical that all these requirements are met at the highest possible level. However, some other, post-manufacturing processes are also critical for the cathode performance, including proper packaging, storage and activation processes.

This paper will not address the physics of the thermionic emission and will be focused on the manufacturing processes and best practices implemented at 3M Technical Ceramics to ensure high quality and reliability of the thermionic cathodes.