

3M Advanced Materials Division

3M™ Hollow Cathodes

Introduction

Hollow Cathodes typically consist of a porous tungsten matrix impregnated with a barium-based emission enhancing material. Depending on the application, the hollow insert may include a high-reliability potted heater assembly and additional support structures.

Hollow cathodes are used in space-qualified applications, from low earth orbit programs to deep space exploration. Applications include ion sources, electric propulsion, plasma contactors and spacecraft neutralization. These devices are mission critical and are constructed using the same quality systems that are used for the manufacture of space-qualified microwave cathodes. Hollow cathode assemblies are built under strict materials and process control, with documentation and test data available as required.

Typical Physical Properties

(Not for specification purposes)

Property	3M™ Hollow Cathodes
Size (diameter)	0.050" – 4" (1.2 mm – 100 mm)
Size (length)	To 6" (150 mm)
Discharge Currents	2 – 50 A

We are involved at each stage of the cathode manufacturing process, from basic raw materials through the manufacturing of critical components to final assembly. This includes

chemical cleaning of the emitting surface to ensure open porosity. Porosity is verified using scanning electron microscopy.

All cathode heater assemblies, if applicable, are tested for proper heater operation. Our quality systems can provide fully qualified cathode assemblies with all required backward and forward material and process traceability.

3M™ Remote Access Data Acquisition and Recovery System (RADAR)

The manufacture of quality components for Vacuum Electron Devices (VEDs) used in the communications, space and defense industries requires precisely-controlled and traceable process steps. Based on 60 years of industry experience, we offer customers a proven software solution that can help automate and simplify their data collection, training and documentation requirements through 3M™ Remote Access Data Acquisition and Recovery System (RADAR).

The 3M remote access data acquisition and recovery system is a suite of software communications tools. Its purpose is to establish best practices for controlling the manufacture of cathodes and cathode assemblies, and to provide customers with all required backward and forward material and process traceability. The system acts as a “bridge,” allowing the exchange of data between multiple software platforms.



3M™ Hollow Cathode Assemblies

RADAR provides nearly instantaneous access to any combination of data, including:

- Employee Training and Task Qualification Records
- ISO Procedures and Revision Control System
- Engineering Drawings and Methods Sheets
- Materials Data Collection and Serialization
- Equipment Process Control and Monitoring System
- SCADA Notification System
- Plant Wide Environmental Controls System

Raw data can also be made available for manipulation in the Infinity QS SPC platform or can be delivered directly to the customer for analysis. This remote access system is fully integrated and provides the user with the power of information 24/7.

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