Product Safety Data Sheet
Glass Thyratrons

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Overview

Glass thyratrons are generally safe when handled and used according to the guidelines included in this data sheet, and require no special handling or processing for safe disposal or environmental protection. Information necessary to facilitate recycling is included.

Inherent Hazards

Glass thyratrons are sufficiently robust to withstand normal handling. However, they do employ a glass envelope that will be broken if knocked, dropped or subject to undue force during installation or removal. In addition to sharp edges of broken glass that will occur in these circumstances, the metal structure of the tube will be exposed and this may also have sharp edges or corners. Follow all normal procedures for the handling of broken glass and other sharps, including use of tools and/or personal protective equipment.

Transportation Hazards

No specific transportation hazards.

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Operational Hazards

High Voltages – Thyratrons operate at high voltages. Equipment should be designed with adequate creepage and clearance distances for the operating voltage and environmental conditions that will occur in use. Equipment should incorporate protective measures such as fail-safe interlocks, discharge circuits and warning markings as required by relevant equipment safety standards.

High Pulse Currents – Thyratrons are used to switch high currents. These can result in substantial electromagnetic pulses that could affect sensitive electronic equipment including life-monitoring or life-sustaining equipment. Equipment should incorporate adequate electromagnetic shielding to ensure no hazard for persons in the immediate vicinity during normal operation. Servicing procedures should include appropriate controls and/or warnings for any service personnel using body worn or implanted active medical devices.

X-Rays – In common with all vacuum electron tubes, thyratrons produce X-rays when operated at voltages in excess of 5 kV. The level of emissions depends on the operating conditions, voltages, and currents. Equipment designers and manufacturers should include shielding, typically steel and/or lead, to reduce emissions to a safe level in accordance with local radiological protection guidelines. Manufacturers and operators of equipment must perform radiation measurements on their equipment under maximum operating conditions to ensure continued safety. Servicing procedures should advise of the risk of operating equipment with radiation shielding removed and advise appropriate mitigation measures.

Hot Surfaces – A tube that has just been in operation may still be hot, even once access panels or doors have been opened. Appropriate warnings should be placed in a prominent position for the protection of servicing personnel.

Decommissioning

There are no additional hazards associated with decommissioning, but care should be taken to avoid exerting undue force on tubes during removal that might result in breakage. Used tubes should be placed in a suitable container to reduce risk of breakage prior to being removed to a disposal facility.

Disposal

There are no hazardous materials in sufficient quantities to require special treatment from an environmental protection aspect. Processes for separation of the materials should be designed to avoid the risks arising from breakage as described above. Processes for the recycling of the materials in electric light bulbs are entirely suitable for this purpose.

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Material Data

The following table of material data provides information to enable disposal in accordance with environmental regulations.

Tube Type	Mass (g)	Approximate Composition (%)														
		Glass	Nickel	Tungsten	Molybdenum	Ceramic	Aluminium	Copper	Glass-bonded mica	Brass	Solder	Barium, Strontium, Calcium	Ni/Cu alloy	Fe/Ni/Co alloy	Other metals	Other materials
5949A, FX2519A/5949A, CX1140 Series, CX1159 Series, CX1553, FX297	691	39	24	7	7	<1	4	1	11	4	1	<1	0	0	<1	<1
CX1141, CX1544, CX1151 series, CX1551, FX2648A, FX2619	900	30	18	6	6	<1	3	6	8	3	<1	<1	13	0	<1	4
CX1622 Series, CX1722 Series, CX1666 Series, CX1644, CX1552, CX1766	915	30	12	6	14	<1	3	6	8	3	<1	<1	13	0	<1	4
CX1569, CX1670A	902	29	16	6	9	<1	3	6	8	3	<1	<1	13	0	<1	4
CX1559	794	26	17	6	17	3	0	4	0	2	<1	<1	6	15	<1	3
01-102139-01B, 8503AF, 8503AG, 8503K, CX1683A, FX2524,	363	19	17	4	8	15	2	4	0	2	1	<1	23	0	<1	6
4C35A, 5C22, 6587, 8503, 8503B, 8503C, CX2523, CV6022, FX2505, FX2614, FX2585, FX2586	315	30	19	8	10	18	0	13	0	4	<1	<1	<1	0	<1	<1
CX1191 Series	368	26	25	7	8	15	0	11	0	5	<1	<1	0	0	<1	<1
FX2613	315	30	19	8	8	15	0	13	0	<1	<1	<1	0	0	<1	<1
CX1585 Series, FX1585	465	22	13	9	7	12	2	7	0	5	1	<1	18	0	<1	5
CX1685 Series, CX1785 Series	465	22	9	9	12	12	2	7	0	5	1	<1	18	0	<1	5
CX1560	340	28	18	7	9	<1	0	14	0	7	2	<1	3	0	<1	11
FX227, FX2530 Series	78	38	26	3	6	<1	5	3	9	4	3	<1	1	0	<1	2
FX2525, FX2535, CX1548, CX1550, CX1639	120	33	33	8	4	<1	3	2	6	3	2	<1	<1	0	<1	1
CX1848, FX2572 Series	130	31	31	8	4	<1	3	4	5	2	2	<1	4	0	<1	5

In the event of encountering difficulties in disposing of these products, contact e2v technologies for advice.

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