

# Health and Safety Hazards for Vacuum Capacitors

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## High Voltage

Operating voltages of vacuum capacitors range from a few hundred Volts to more than 50'000 Volts. Since these voltages can be deadly, the equipment, in which the vacuum capacitors are enclosed, must be manufactured to assure that no personnel can come into contact with high voltage circuits. All equipment must be designed to include safety enclosures for high voltage circuits, with fail safe door interlock switches which will switch off the power supply and ensure the discharge of all high voltage capacitors.

Never bypass or "cheat" interlock switches!

Guard against residual capacitor charges by simultaneously touching both ends of capacitor with a grounding bar prior to handling.

## X-ray Radiation

All high voltage devices operating above 10 kV produce progressively more dangerous X-ray radiation as the voltage is increased. Moreover, the X-ray radiation level may increase significantly with life and gradual deterioration due to changing leakage path over time.

It is imperative to assure adequate shielding of capacitors based on measurements and in accordance with the applicable local laws covering X-ray radiation.

If there is any doubt as to the adequacy of shielding, an expert in this field must be contacted to perform an X-ray survey of the equipment.

## RF Radiation (under 300 MHz)

Personnel must not be exposed to excessive RF radiation and must avoid exposure even at relatively low frequencies.

Proper enclosures and efficient coupling of the RF energy to the load will minimize the hazard, and shall be in accordance with tool manufacturer guidelines and local regulations.

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# 真空电容器健康和安全危害

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## 高电压

真空电容器的工作电压介于几百伏特与五万多伏特之间。由于该范围的电压是致命的，因此内含真空电容器的设备生产必须保证没有人员可以接触到高电压电路。所有设备在设计时必须包含高电压电路的安全罩，且需具有故障保护门连锁开关，该开关将会切断电源并确保所有高电压电容器进行放电。

禁止避开或“蒙蔽”连锁开关。

在操作之前，用接地排同时接触电容器的两端，以防止电容器残留电荷。

## X射线辐射

所有运行在一万伏特以上的高电压设备，随着电压的增长会产生越来越危险的X射线辐射。另外，随着时间的推移，X射线辐射等级可能会随着使用寿命而显著增强，以及随着漏电路径的不断变化而衰减。

必须根据实际测量情况和关于X射线辐射的适用的当地法律来确保电容器得到适当防护。

如果对适当防护有任何疑问，应咨询该领域的专家来对设备进行X射线检查。

## 射频辐射（低于300兆赫兹）

任何人员都不应暴露于过强的射频辐射中，即使对于相对较低的频率，也应避免。

适当的封装以及射频能量与负载的有效耦合将会使危害最小化，但操作流程应遵守设备生产商指南以及当地规范。

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