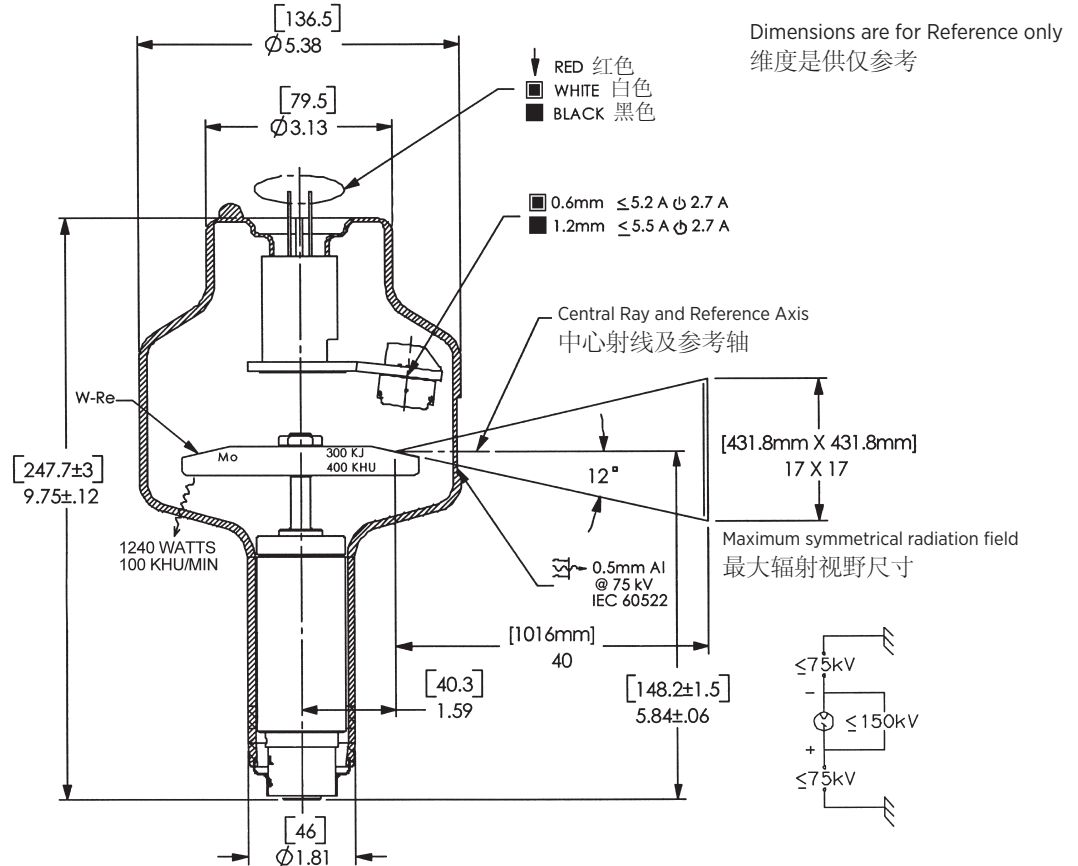


- Common - Red  
公共 - 红色
- Large - Black  
大焦点 - 黑色
- Small - White  
小焦点 - 白色
- Stand - By  
备用
- Frame or Chasis  
框架或底盘
- X-Ray Tube  
X 射线管
- Radiation Filter or Filtration  
辐射过滤器或过滤



Note: Document originally drafted in the English language.  
注释: 文件最初用英语起草。

### Product Description

The RAD-60 is a 4" (100 mm) 150 kV, 300 kJ (400 kHU) maximum anode heat content, rotating anode insert. This insert is specifically designed for general radiographic and fluoro/spotfilm procedures. The insert features a 12° rhenium-tungsten molybdenum target and is available with the following nominal focal spots:

0.6 - 1.2  
IEC 60336

#### Nominal Anode Input Power

Small - 40 kW IEC 60613  
Large - 100 kW IEC 60613

For the equivalent anode input power of 120 Watts

### 产品说明

RAD-60 是一款具有 4" (100 mm) 靶盘, 150 kV, 300 kJ (400 kHU) 最大阳极热容量的旋转阳极 X 射线管芯。此管芯经专门设计, 可适用于大功率普通放射成像和荧光分光光度计/点片程序。该管芯的靶盘结构为 12° 靶角, 铼钨钼合金靶材, 可提供下列尺寸的标称焦点:

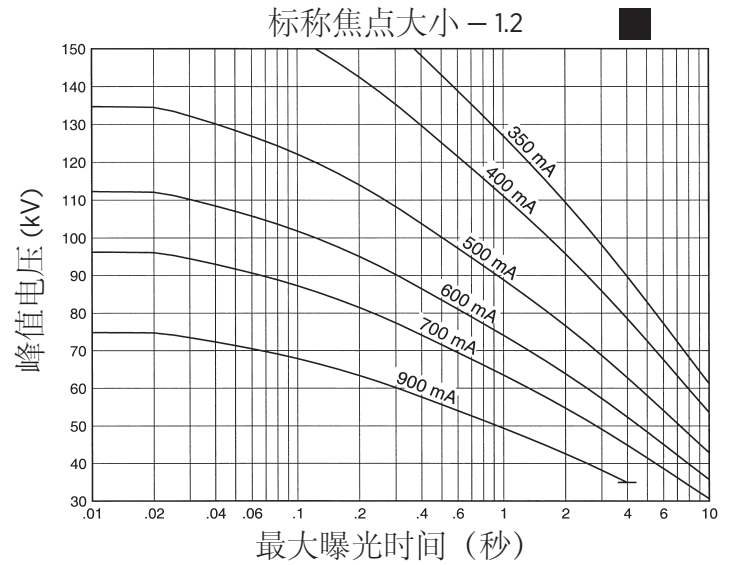
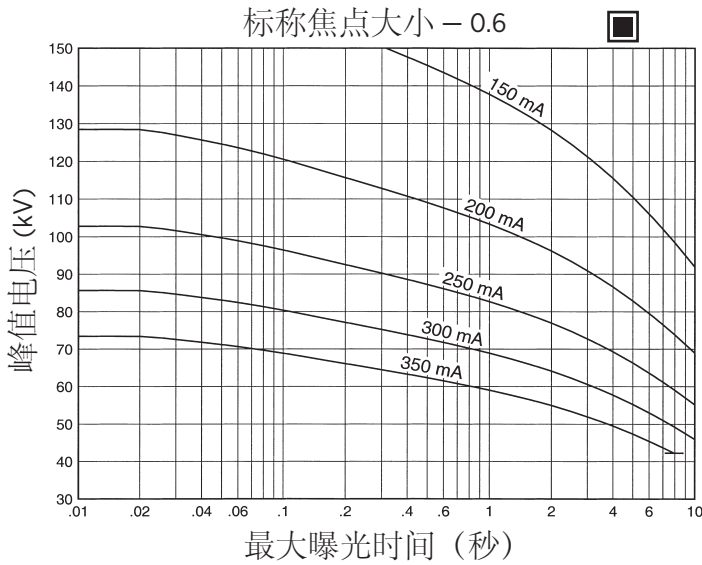
0.6 - 1.2  
IEC 60336

标称阳极输入功率  
小焦点 - 40 kW IEC 60613  
大焦点 - 100 kW IEC 60613

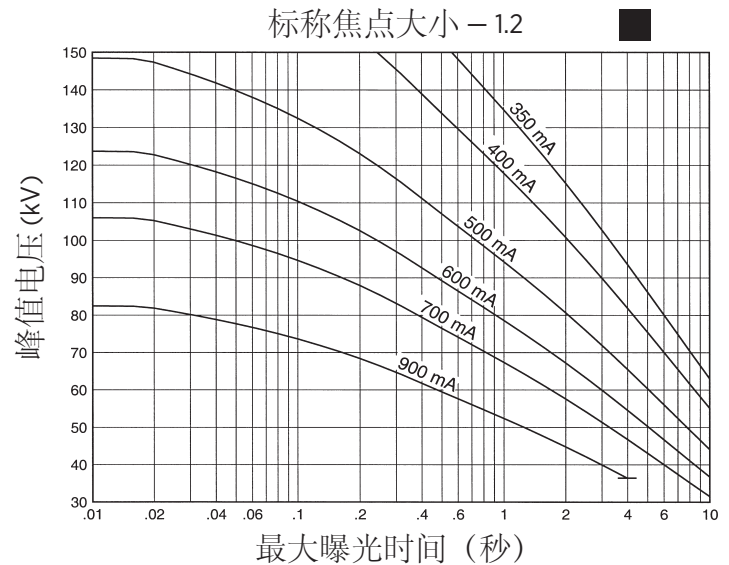
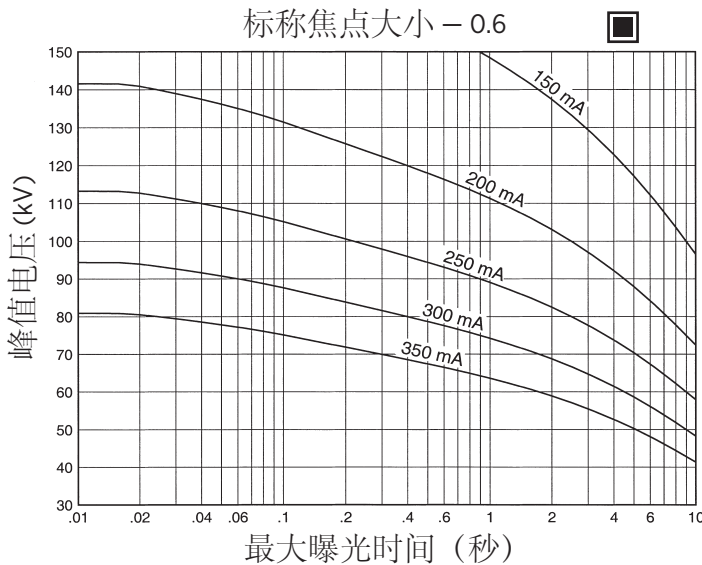
适用于 120 瓦的等效阳极输入功率

3 Ø 恒定电压

**50 HZ - 2,850 RPM**



**60 HZ - 3,450 RPM**

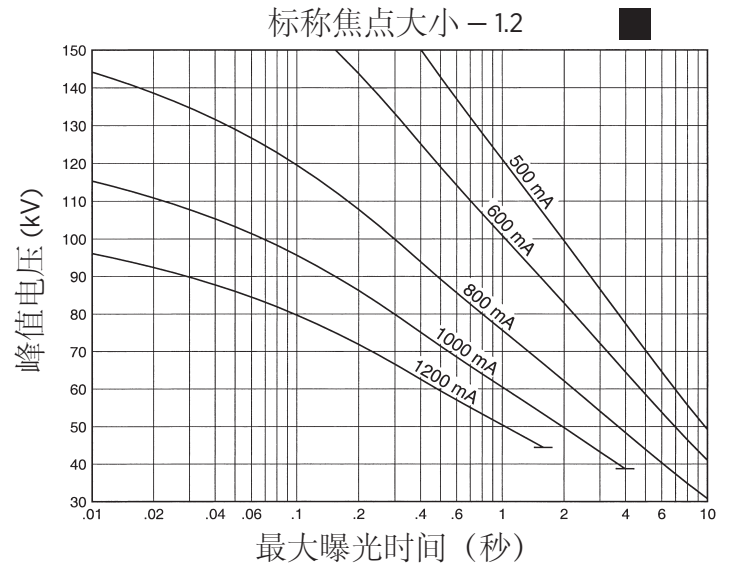
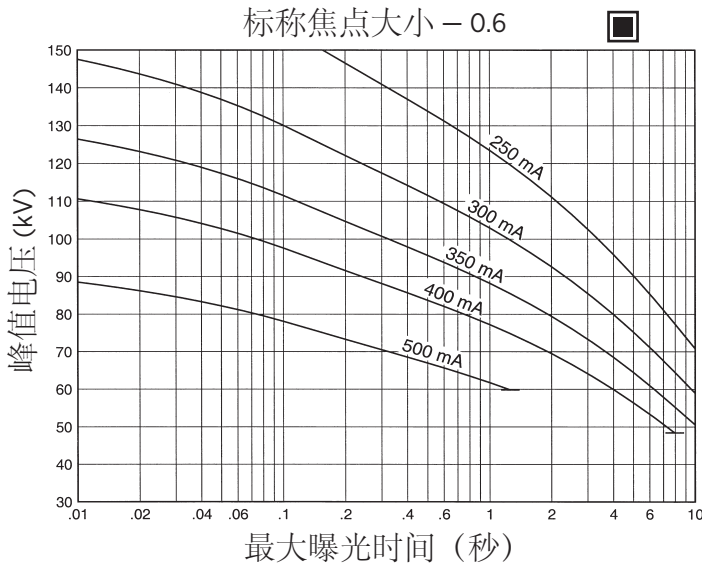


Nominal anode input power for the anode heat content 40%. IEC 60613

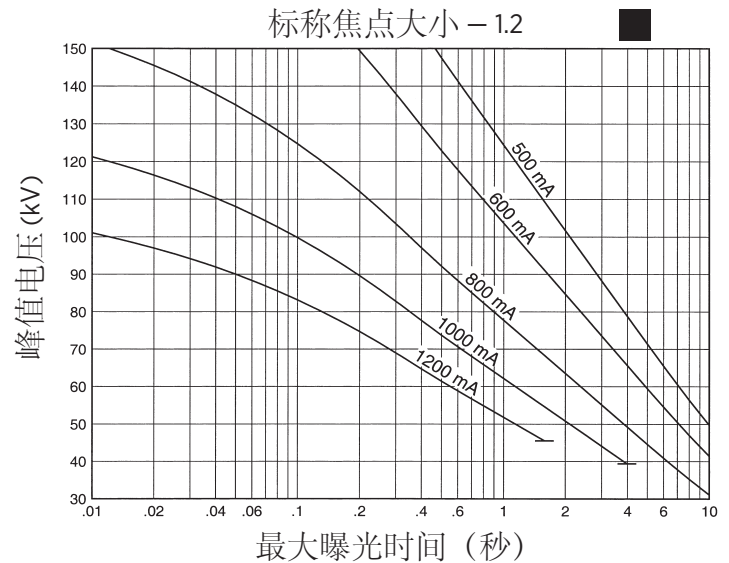
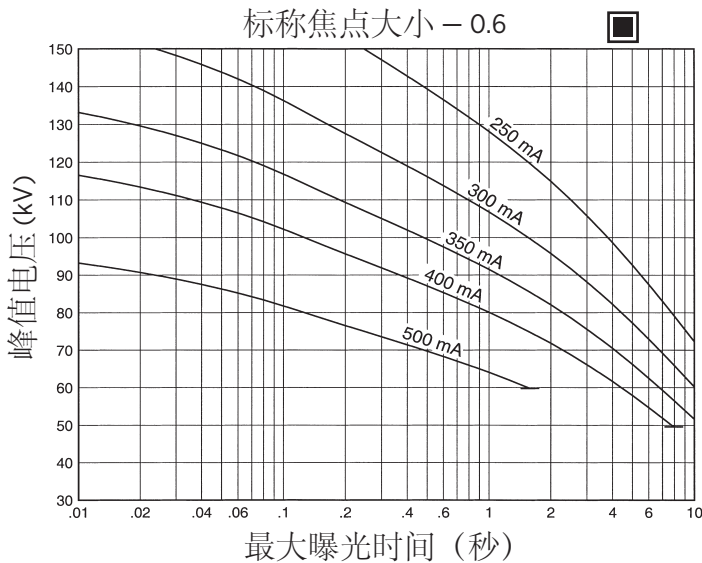
阳极热容量 40% 的标称阳极输入功率。IEC 60613

3 Ø 恒定电压

**150 HZ - 8,500 RPM**



**180 HZ - 10,000 RPM**



Nominal anode input power for the anode heat content 40%. IEC 60613

阳极热容量 40% 的标称阳极输入功率。IEC 60613

## CINERADIOGRAPHIC RATINGS HOW TO USE CINERADIOGRAPHIC CHARTS

**General:** With the Cineradiographic rating chart we can determine the maximum allowable kW of the Cine pulse, or with a given kW determine maximum time in seconds the Cine run can progress.

The Most common way of using the charts is to determine maximum time of any expected Cine run and maximum duty factor. With a known duty factor and Cine run time kW can easily be determined.

### Definition of Terms

**Time in seconds:** Total time of one Cine run, usually 5 to 12 seconds.

**Duty Factor in Percent (DF%):** Actual time during one second the x-ray tube is producing x-rays. If we select a 5 msec pulse width and 60 exposures per second the x-ray tube will be producing x-rays for a total of 250 msec each second or 25% of the time. The higher the DF number, the more load placed on the x-ray tube.

**Peak Pulse Power:** Peak energy in watts of any one Cine Pulse. Can be any combination of kV and mA allowed by Radiographic and Filament Emission curves.

Example: 80 kV at 400 mA equals

$$80,000 \text{ V} \times 0.4 \text{ A} = 32,000 \text{ W or } 32 \text{ kW}$$

### USING THE CINE RATING CHARTS:

RAD-90 150/180 Hz 3 Phase 1.2 Focal Spot

**Example:** Determine maximum kW allowed with the following known factors:  
 Maximum Pulse Width ..... 2 msec  
 Exposures per Second ..... 60  
 Maximum Cine Run Time ..... 4.5 seconds

### Calculate Duty Factor: (DF%)

$$DF\% = \frac{\text{Pulse Width (mSec)} \times \text{Frames per Second}}{10}$$

$$DF\% = \frac{2 \text{ msec} \times 60 \text{ exp/sec}}{10} = \frac{120}{10} = 12\%$$

Refer to Rating Chart RAD-60 150/180 Hz 3 Phase 1.2 Focal Spot:

At bottom of chart find 2 second line. Move vertically to intersection with 12% DF curve. Make a horizontal reference to left side of rating chart and note kW rating of 80 kW.

We now know each pulse during the cine run can have a maximum rating of 80 kW under conditions given in example.

kW = kV x mA. The kW of the exposure can be any combination of mA and kV allowed by the Radiographic and Filament Emission Charts.

The Cine rating charts are usable to 100% anode heat storage. The start of Cine run should be below 70% and heat storage. Exceeding 100% anode heat storage will cause anode track erosion with high risk of tube destruction.

## 电影摄影额定功率 如何使用电影摄影负载图

概述: 利用电影摄影额定功率图, 我们可以确定 Cine 脉冲的最大允许千瓦功率, 或者用给定的千瓦值确定 Cine 运行的最长时间 (秒)。

使用图表最常用的方法是确定任何预期的 Cine 运行的最长时间和最大占空系数。只要知道了占空系数和 Cine 运行时间, 就可以轻松确定功率。

### 术语定义

时间 (秒): Cine 运行一次的总时间, 通常为 5 到 12 秒钟。

占空系数 (DF%): x 射线管生成 x 射线的一秒钟内的实际时间。如果我们选择 5 毫秒脉冲宽度和每秒 50 次曝光, x 射线管将会产生每秒总计 250 毫秒的 x 射线或 24% 的时间。DF 数越大, x 射线管上可承载的负载越高。

峰值脉冲功率: 任一 Cine 脉冲的峰值能量 (W)。可以是放射成像和灯丝发射曲线允许的任一 kV 和 mA 组合。

例如: 400 mA 时 80 kV 等于

$$80,000 \text{ V} \times 0.4 \text{ A} = 32,000 \text{ W or } 32 \text{ kW}$$

### 使用 CINE 额定功率图:

RAD-60 150/180 Hz 三相 1.2 焦点

例如: 确定下列已知系数下的最大功率 (kW):  
 最大脉冲宽度 ..... 2 毫秒  
 每秒曝光次数 ..... 60  
 最长 Cine 运行时间 ..... 4.5 秒

### 计算占空系数: (DF%)

$$DF\% = \frac{\text{脉冲宽度 (毫秒)} \times \text{每秒的帧数}}{10}$$

$$DF\% = \frac{2 \text{ 毫秒} \times 60 \text{ 次曝光/秒}}{10} = \frac{120}{10} = 12\%$$

参考额定功率图 RAD-60 150/180 Hz 三相 1.2 焦点:

在图的下面找到 2 秒一行。垂直移动到与 12% 的 DF 曲线交叉。水平移动到额定功率图的左侧, 并记录 80 kW 的额定功率。

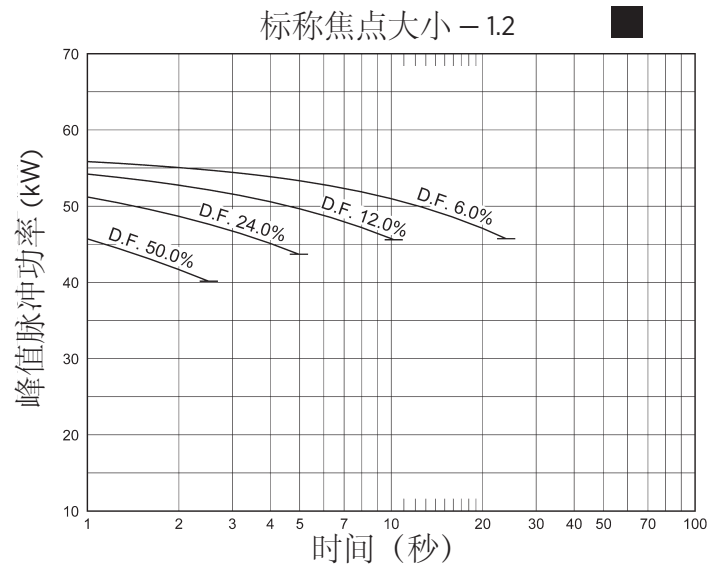
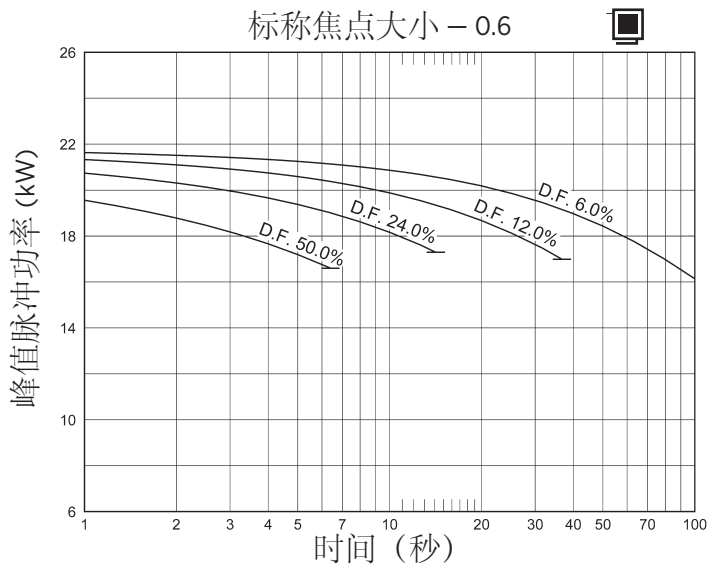
我们现在知道在例子给出的条件下, Cine 运行时每个脉冲可以有最大 80 kW 的额定功率。

kW = kV x mA。 曝光的功率可以是放射成像和灯丝发射图允许的任何 mA 和 kV 组合。

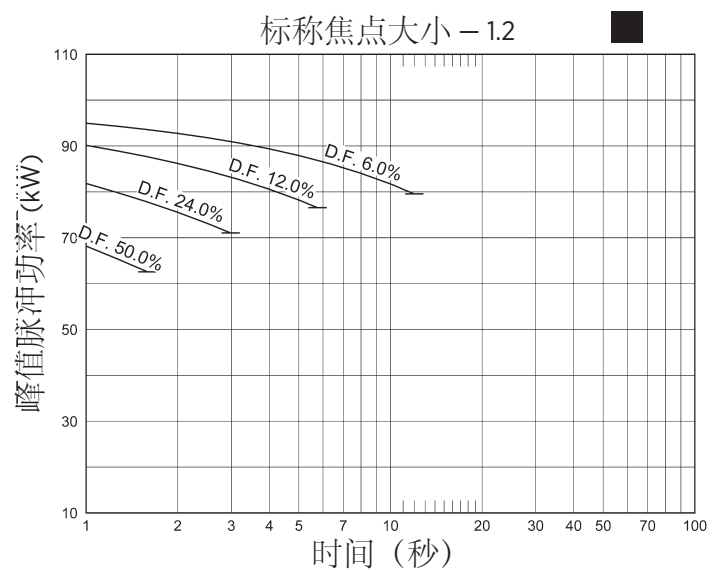
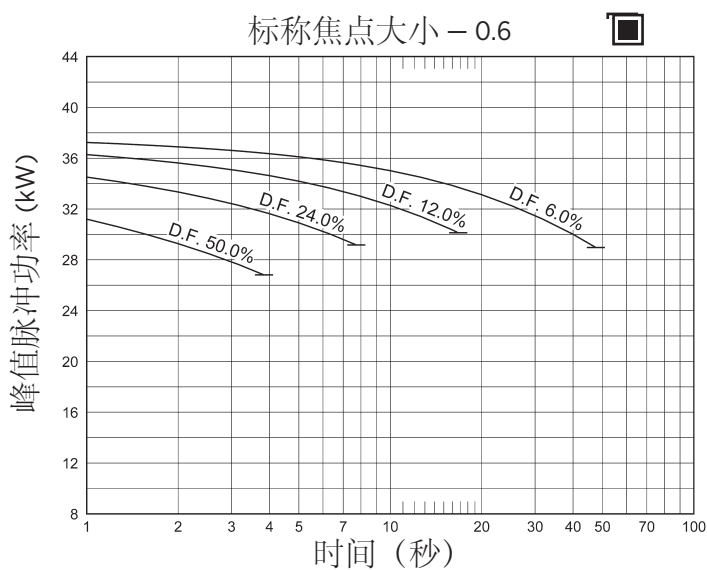
Cine 额定功率图可用于 100% 阳极热容量。Cine 开始运行时热容量应该低于 70%。超过 100% 的阳极热容量将导致阳极磁道腐蚀, 且很容易损坏射线管。

## 3 Ø 恒定电压

### 50/60 Hz



### 150/180 Hz



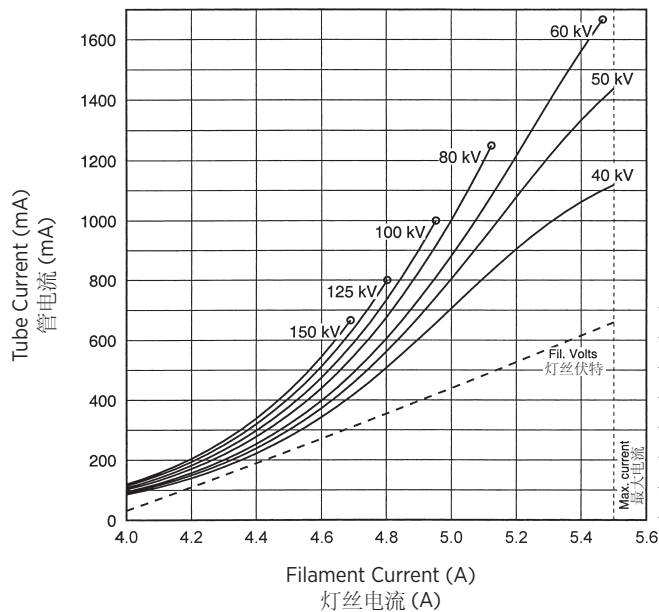
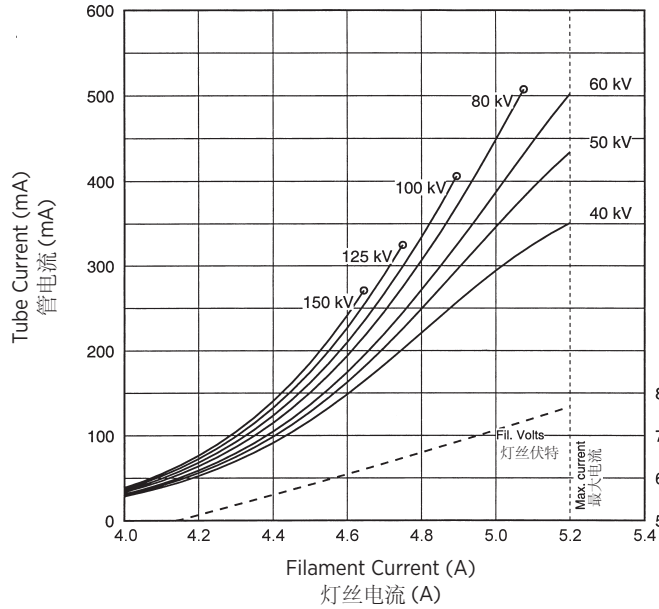
Nominal anode input power for the anode heat content 70%. IEC 60613

Puissance calorifique nominale de l'anode: 70%, CEI 60613

Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 70%. IEC 60613

Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 60613

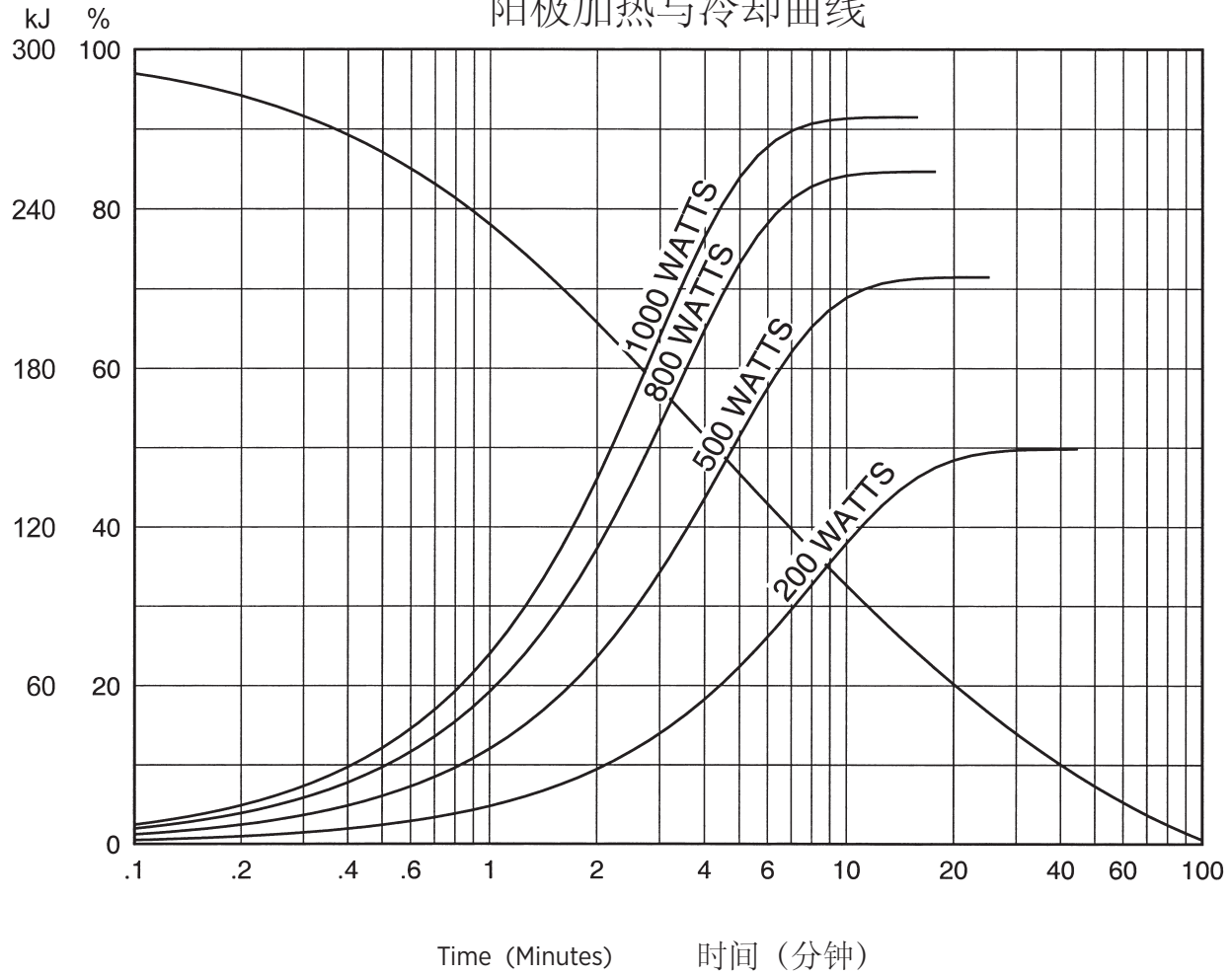
## 3 Ø 恒定电压



Note: When using these emission curves for trial exposures, refer to the power rating curves shown for maximum kV, tube emission, filament current, exposure time, and target speed.

注释: 当为试验曝光使用这些辐射曲线时, 请同时参考额定功率曲线中与最大管电压、管电流、灯丝电流、曝光时间和阳极靶转速相关的限制条件。

**ANODE HEATING AND COOLING CURVES**  
阳极加热与冷却曲线





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