VARIAN
medical systems

X-RAY PRODUCTS

RAD-50
Rotating Anode X-Ray Tube

Tubes Radiogénes à Anode Tournante
Röntgenröhre mit Rotierender Anode
Tubos de Rayos-X con Ánodo Giratorio

Large - Black
Grand - Noir
Gross - Schwarz
Largo - Negro

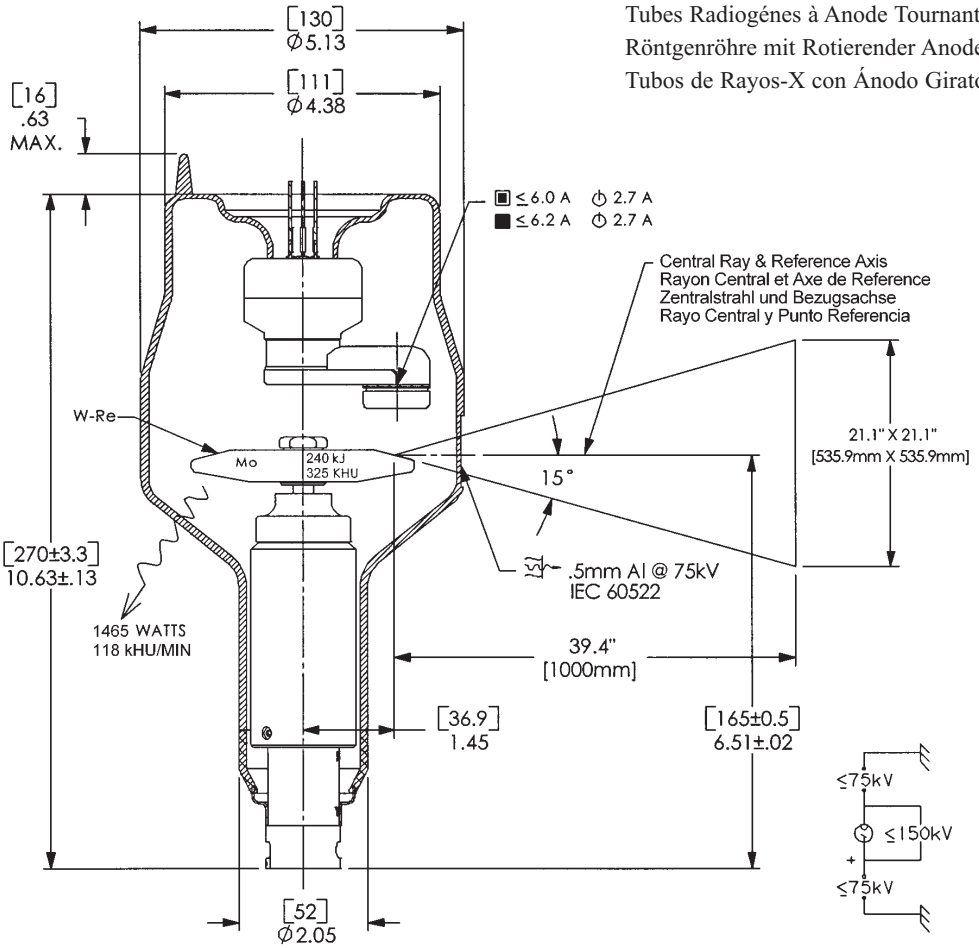
Small -White
Petit - Blanc
Klein - Weiss
Pequeño - Blanco

Stand - By
Attente
Bereitschaft
En Espera

Frame or Chasis
Masse
Chassis
Soporte o Chasis

X-Ray Tube
Tube Radiogène
Röntgenröhre
Tubo de Rayos X

Radiation Filter or Filtration
Filtre de rayonnement
Filterung
Filtración de Radiación



Note: Document originally drafted in the English language.

Product Description

The RAD-50 is a 3.5" (90mm) 150 kV, 240 kJ (325 kHU) maximum anode heat content, rotating anode insert. This insert is specifically designed for general radiographic and fluoro/spot film procedures. The insert features a 15° rhenium-tungsten molybdenum target and is available with the following nominal focal spots:

0.6 - 1.0
IEC 60336

Nominal Anode Input Power
Small - 31.5 kW IEC 60613
Large - 52.5 kW IEC 60613
For the equivalent anode input power of 140 Watts

Description du Produit

Le tube RAD-50, à anode tournante de 90mm (3,5 pouces), 150 kV, avec une capacité calorifique maximale de 240 kJ (325 kUC) est à usage spécifique pour la radiographie de grande puissance et pour la radio-fluorographie. L' anode composite en Rhènium - Tungsténe-Molybdéne avec pente d'anode de 15° est disponible avec les combinaisons focales suivantes:

0,6 - 1,0
CEI 60336

Puissance anodique nominale de l'anode
Petit foyer - 31.5 kW CEI 60613
Grand foyer - 52.5 kW CEI 60613
Pour la puissance anodique d'equilibre thermique de 140 Watts

Produktbeschreibung

Die RAD-50 ist eine 90mm (3.5zoll) Doppelfokus Drehanoden-Röntgenröhre, mit einer Wärmespeicherkapazität des Anodentellers von 240 kJ (325 kHU) und einer max. Spannungsfestigkeit von 150 kV. Die Röhre wurde für stark frequentierte Aufnahmearbeitsplätze und für den Durchleuchtungs- und Zielgerätebetrieb (1mm FFA) ausgelegt. Der Rhenium, Wolfram, und Molybdän Anodenteller besitzt einen Winkel von 15°. Folgende Brennfleckkombinationen ist lieferbar:

0.6 - 1.0
IEC 60336

Nominale Anodenbezugsleistung
Klein - 31.5 kW IEC 60613
Gross - 52.5 kW IEC 60613
Gilt bei einer Aquivalent - Anodenleistung von 140 Watt

Descripcion del Producto

El RAD-50 es un tubo de ánodo giratorio de 90mm, (3.5"), 150 kV, 240 kJ (325 kUC) diseñado especificamente para procedimientos generales de alto volumen en radiografía y fluoroscopía. Consta de un objectivo de renio, tungsteno y molibdeno con pendiente de 15 grados. Disponible con las siguientes combinaciones de marcas focales:

0.6 - 1.0
IEC 60336

Potencia nominal de entrada del anodo
Foco fine - 31.5 kW IEC 60613
Foco grueso - 52.5 kW IEC 60613
Para una potencia equivalente del anodo de 140 Watts

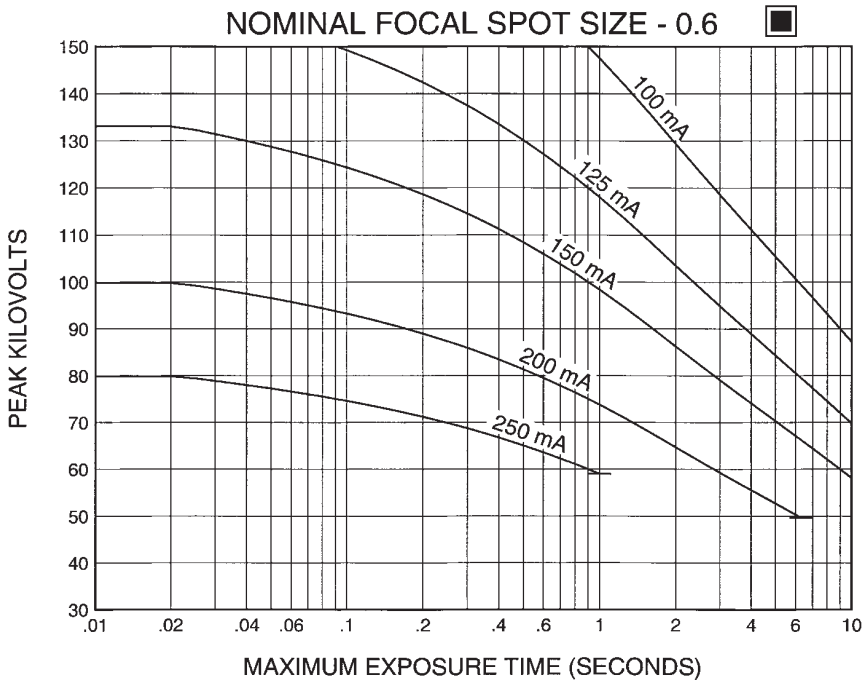
1359 Rev E 05/07

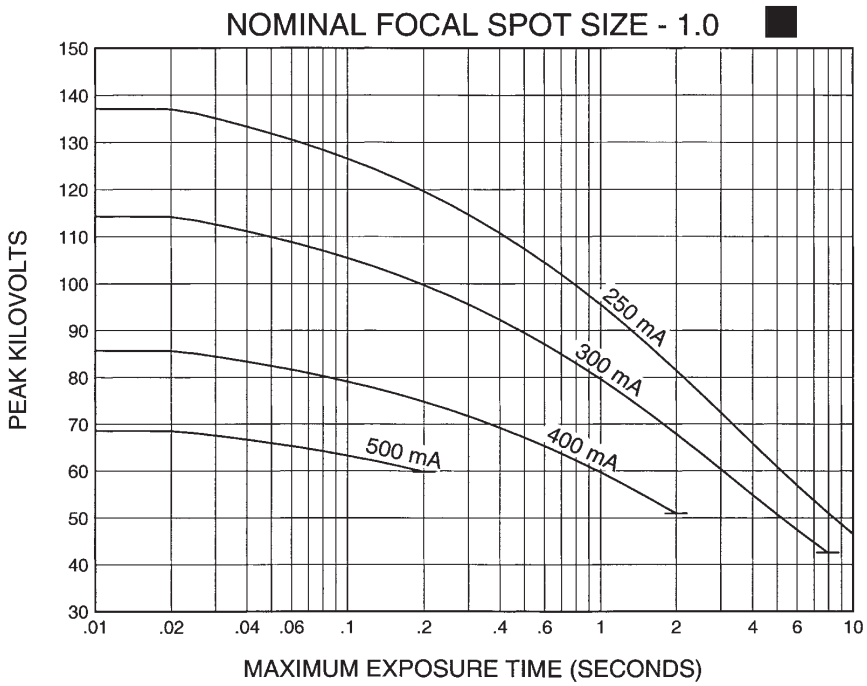
Manufactured by Varian Medical Systems
Fabrique par Varian Medical Systems
Hergestellt von Varian Medical Systems
Fabricado por Varian Medical Systems

3 Ø Constant Potential ⎓

50 HZ - 2,850 RPM

Abaques de Chargepour Pose Unique CEI 60613
Brennfleck - Belastungskurven IEC 60613
Diagramas de Exposición Radiográfica IEC 60613



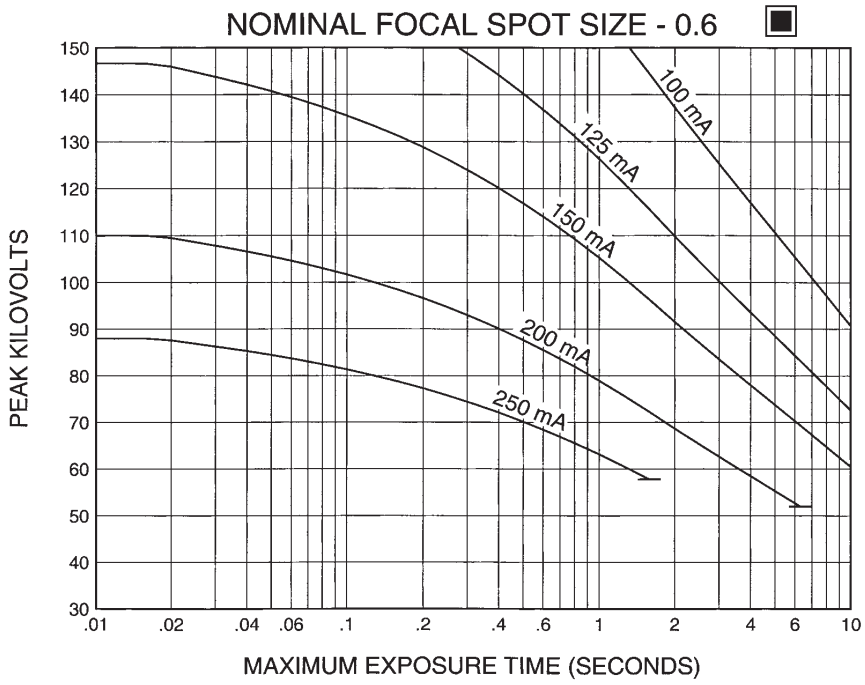


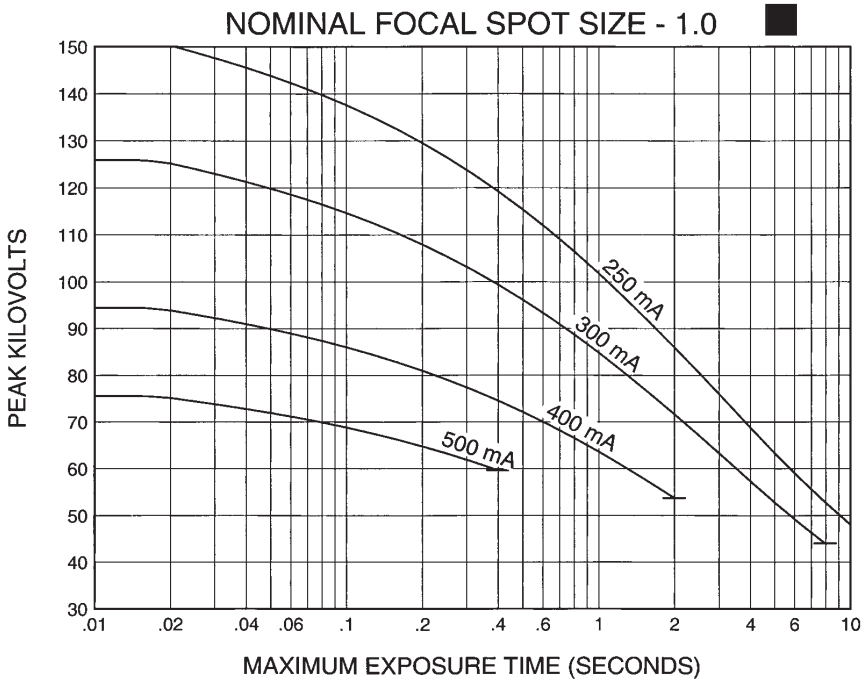
Nominal anode input power for the anode heat content 40%. IEC 60613	Puissance calorifique nominale de l'anode: 40%, CEI 60613	Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 40%. IEC 60613	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 60613

3 Ø Constant Potential ⎓

60 HZ - 3,450 RPM

Abaques de Chargepour Pose Unique CEI 60613
Brennfleck - Belastungskurven IEC 60613
Diagramas de Exposición Radiográfica IEC 60613



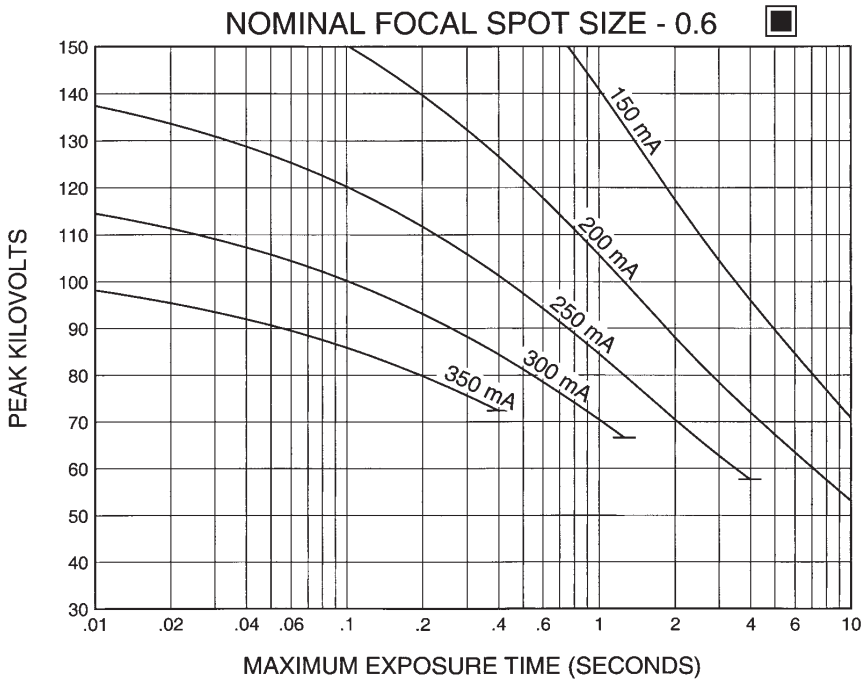


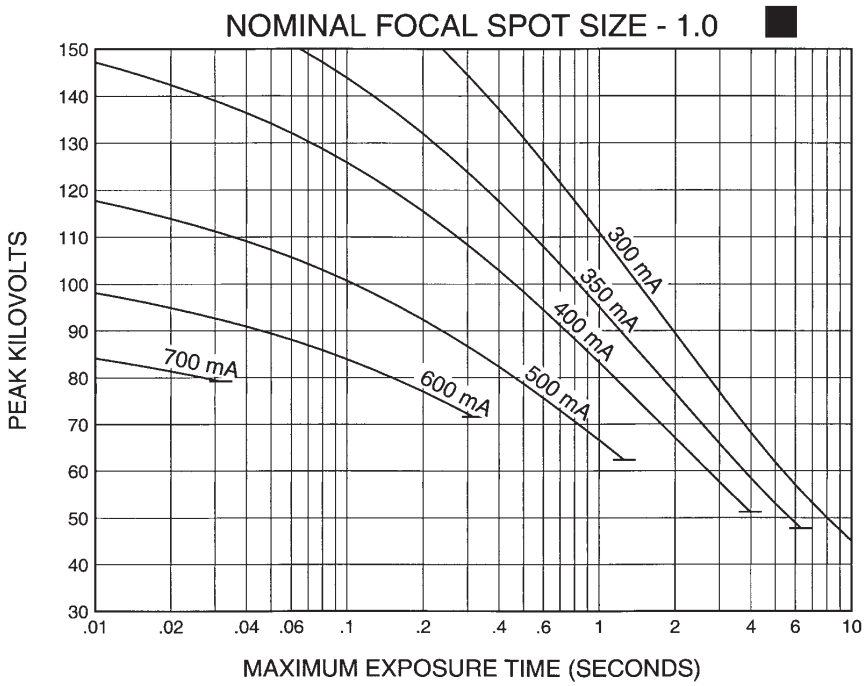
Nominal anode input power for the anode heat content 40%. IEC 60613	Puissance calorifique nominale de l'anode: 40%, CEI 60613	Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 40%. IEC 60613	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 60613

3 Ø Constant Potential ⎓

Abaques de Chargepour Pose Unique CEI 60613
Brennfleck - Belastungskurven IEC 60613
Diagramas de Exposición Radiográfica IEC 60613

150 HZ - 8,500 RPM



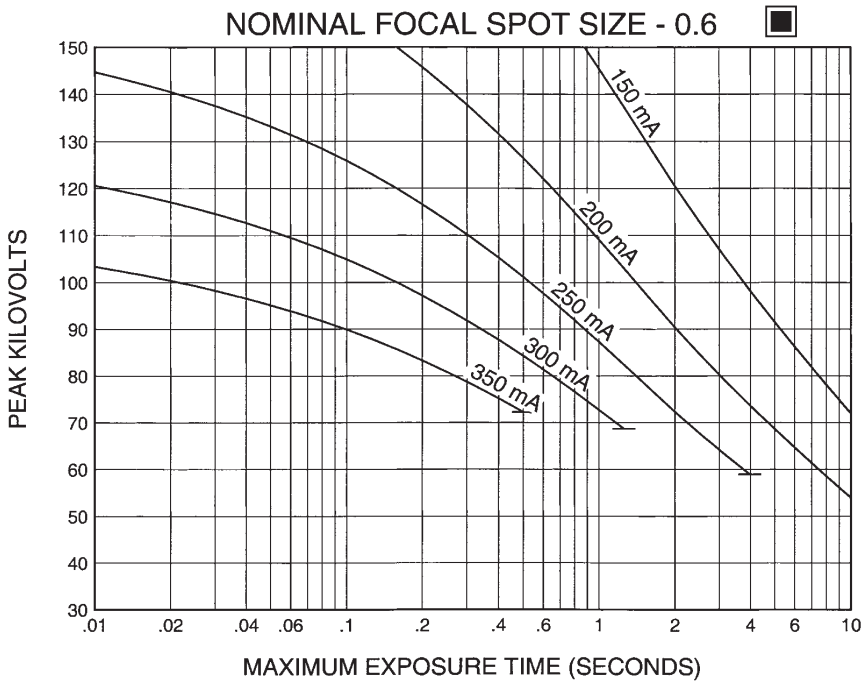


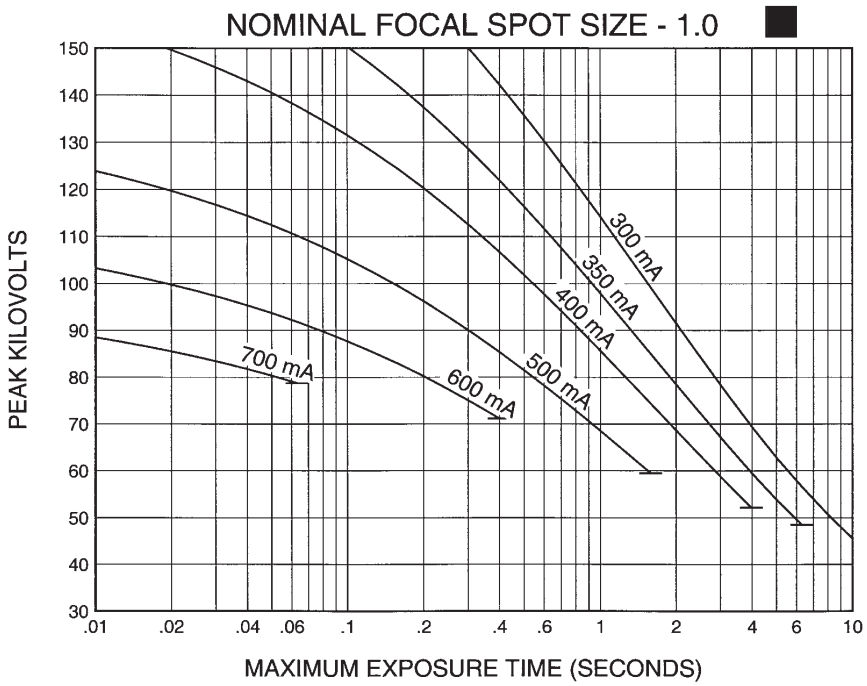
Nominal anode input power for the anode heat content 40%. IEC 60613	Puissance calorifique nominale de l'anode: 40%, CEI 60613	Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 40%. IEC 60613	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 60613

3 Ø Constant Potential ⎓

180 HZ - 10,000 RPM

Abaques de Chargepour Pose Unique CEI 60613
Brennfleck - Belastungskurven IEC 60613
Diagramas de Exposición Radiográfica IEC 60613





Nominal anode input power for the anode heat content 40%. IEC 60613	Puissance calorifique nominale de l'anode: 40%, CEI 60613	Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 40%. IEC 60613	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 60613

ANGIOGRAPHIC RATINGS

HOW TO USE ANGIOGRAPHIC CHARTS

General: Serial Radiography puts a severe demand on the x-ray tube due to the large number of exposures made in rapid succession. Intervals between exposures are fixed and so short that it is not possible for the anode track to cool to any extent during the exposure series. Therefore, the temperature of the anode track increases from exposure to exposure. The kW values used in the angiographic charts have been determined to prevent damage to the anode. The angiographic rating charts are usable to 100% anode heat storage. Exceeding 100% anode heat storage will cause anode track erosion with high risk of tube destruction.

Definition of Terms

Number of Exposures in Series: The number of exposures made in succession or the number of exposures made during one contrast injection.

Exposure Rate: The number of exposures made per second. For a series of exposures where the exposure rate changes, it must be assumed that all exposures will be made at the maximum rate. For example, if during a series 10 exposures will occur at one per second and 30 exposures at 4 per second, use the kW ratings in the 40 exposure column at 4 per second rate.

Exposure Time: Time in seconds of each exposure.

USING THE CHARTS:

Select Correct Chart:

50/60 or 150/180 Hz
0.6 or 1.0 Focal Spot

Note: 150/180 Hz rotor speed recommended for all angiography.

Determine the number of exposures in Series: With cut film angiography the number of exposures are known, however in Digital Angiography the number of exposures commonly are not known. When determining the number of exposures, assume worst case or past history.

Note: Most angiographic x-ray tubes fail from underestimating the number of exposures made in a series.

Determine kW of each exposure in Series: Referring to chart —find block under “Number of Exposures in Series” that is greater than or equal to expected number of exposures in Series. On left side directly opposite this block under “Exposure Rate per Second” column, select maximum rate per second that will be used for the exposure series. At the intersection of exposure rate and exposure time in seconds, find maximum kW allowed for each exposure.

kW = pkV x mA: The kW of the exposure can be any combination of mA and pkV allowed by the Radiographic and Filament Emission charts.

For Example: 80 pkV and 500 mA = 40 kW

Example: From chart RAD-50 150/180 Hz 3 Phase 1.0 Focal Spot, determine kW allowed with following known factors.
Maximum number of exposures 40
Exposure time .050 second (50 milliseconds)
Maximum Exposure per second 4

From chart find 40 exposure block. On left side directly opposite this block under “Exposure Rate per Second” column, select 4 exposures per second. Find .050 seconds at top of chart. At intersection of exposure rate line and exposure time, find 29.2 kW.

0.6 Focal Spot 3Ø 15 Degrees 50/60 Hz
0,6 Dimension Focale 3Ø 15 Degrés 50/60 Hz
0.6 Brennfleck 3Ø 15 Grad 50/60 Hz
0.6 De Marca Focal 3Ø 15 Grados 50/60 Hz

Caractéristoques Pour L'Angiographie CEI 60613
Angiographische Nennleistungen IEC 60613
Gradaciones Angiografica IEC 60613

Exposure rate per second	Tube load (kW) as a function of the exposure time (seconds) of the individual radiographs of the series															Number of exposures in series
	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.225	0.250	
1	16.9	16.7	16.3	16.0	15.7	15.5	15.0	14.6	14.2	13.8	13.5	13.2	12.9	12.5	12.2	10
2	16.8	16.6	16.1	15.8	15.4	15.1	14.5	14.1	13.6	13.2	12.8	12.5	12.1	11.7	11.4	
3	16.8	16.5	16.0	15.6	15.2	14.9	14.2	13.7	13.2	12.7	12.3	11.9	—	—	—	
4	16.7	16.4	15.9	15.4	15.0	14.7	14.0	13.4	12.9	12.4	—	—	—	—	—	
8	16.6	16.2	15.6	15.0	14.6	14.1	—	—	—	—	—	—	—	—	—	
15	16.5	15.9	15.2	14.6	—	—	—	—	—	—	—	—	—	—	—	
30	16.3	15.5	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	16.8	16.5	16.0	15.6	15.3	14.9	14.3	13.8	13.3	12.9	12.5	12.1	11.8	11.3	11.0	20
2	16.7	16.3	15.8	15.3	14.9	14.5	13.8	13.2	12.6	12.1	11.7	11.3	10.9	10.4	10.1	
3	16.6	16.2	15.6	15.0	14.6	14.1	13.4	12.7	12.1	11.6	11.1	10.7	—	—	—	
4	16.5	16.0	15.4	14.8	14.3	13.9	13.0	12.3	11.7	11.1	—	—	—	—	—	
8	16.3	15.7	14.9	14.2	13.6	13.0	—	—	—	—	—	—	—	—	—	
15	16.1	15.3	14.4	13.6	—	—	—	—	—	—	—	—	—	—	—	
30	15.8	14.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	16.6	16.1	15.6	15.0	14.5	14.1	13.3	12.7	12.1	11.5	11.0	10.6	10.2	9.7	9.3	40
2	16.5	15.9	15.2	14.6	14.1	13.6	12.7	12.0	11.3	10.8	10.3	9.8	9.4	8.9	8.5	
3	16.4	15.7	15.0	14.3	13.7	13.2	12.3	11.5	10.8	10.2	9.7	9.2	—	—	—	
4	16.3	15.6	14.8	14.0	13.4	12.9	11.9	11.1	10.3	9.7	—	—	—	—	—	
8	16.0	15.0	14.1	13.2	12.5	11.8	—	—	—	—	—	—	—	—	—	
15	15.6	14.4	13.3	12.3	—	—	—	—	—	—	—	—	—	—	—	
30	15.2	13.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	16.4	15.8	15.1	14.5	13.9	13.4	12.5	11.7	11.1	10.5	10.0	9.5	9.1	8.1	7.3	60
2	16.3	15.6	14.8	14.1	13.5	12.9	11.9	11.1	10.4	9.8	9.2	8.8	8.3	7.8	7.3	
3	16.2	15.4	14.5	13.8	13.1	12.5	11.5	10.6	9.9	9.2	8.7	8.2	—	—	—	
4	16.1	15.2	14.3	13.5	12.8	12.1	11.1	10.2	9.4	8.8	—	—	—	—	—	
8	15.7	14.6	13.5	12.6	11.7	11.1	—	—	—	—	—	—	—	—	—	
15	15.3	13.9	12.6	11.5	—	—	—	—	—	—	—	—	—	—	—	
30	14.7	12.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	16.3	15.5	14.7	14.0	13.4	12.8	11.8	11.0	10.3	9.6	8.6	7.6	6.9	6.1	5.5	80
2	16.1	15.3	14.4	13.6	12.9	12.3	11.2	10.4	9.6	9.0	8.4	7.6	6.9	6.1	5.5	
3	16.0	15.1	14.1	13.3	12.5	11.9	10.8	9.9	9.1	8.5	7.9	7.5	—	—	—	
4	15.9	14.9	13.8	13.0	12.2	11.5	10.4	9.5	8.7	8.1	—	—	—	—	—	
8	15.5	14.2	13.0	12.0	11.2	10.4	—	—	—	—	—	—	—	—	—	
15	15.0	13.4	12.1	10.9	—	—	—	—	—	—	—	—	—	—	—	
30	14.3	12.4	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	16.1	15.3	14.3	13.6	12.9	12.2	11.2	10.3	9.2	7.9	6.9	6.1	5.5	4.9	4.4	100
2	16.0	15.0	14.0	13.2	12.4	11.8	10.7	9.7	9.0	7.9	6.9	6.1	5.5	4.9	4.4	
3	15.8	14.8	13.7	12.8	12.0	11.4	10.2	9.3	8.5	7.9	6.9	6.1	—	—	—	
4	15.7	14.6	13.5	12.5	11.7	11.0	9.8	8.9	8.1	7.5	—	—	—	—	—	
8	15.3	13.9	12.6	11.6	10.7	10.0	—	—	—	—	—	—	—	—	—	
15	14.8	13.1	11.6	10.5	—	—	—	—	—	—	—	—	—	—	—	
30	14.0	11.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	15.7	14.6	13.5	12.6	11.8	11.1	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	150
2	15.6	14.4	13.2	12.2	11.4	10.6	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
3	15.5	14.1	12.9	11.9	11.0	10.3	9.1	7.3	6.1	5.2	4.6	4.1	—	—	—	
4	15.3	13.9	12.6	11.6	10.7	9.9	8.7	7.3	6.1	5.2	—	—	—	—	—	
8	14.9	13.2	11.8	10.7	9.7	9.0	—	—	—	—	—	—	—	—	—	
15	14.3	12.4	10.8	9.6	—	—	—	—	—	—	—	—	—	—	—	
30	13.5	11.1	—	—	—	—	—	—	—	—	—	—	—	—	—	

Note:
1. (kW) of Exposure Equals mA x kV. For Example: 70 kV x 300 mA = 21 kW.
2. Exposures less than .010 seconds will have a kW rating same as .010 seconds.

Remarque:
1. (kW) en exposition égale kV x mA. Par exemple: 70 kV x 300 mA = 21 kW.
2. Les expositions inférieures à 0.010 sec. ent les mémes valuers en kW que celles de 0.010 sec.

Anmerkungen:
1. (kW) der Belichtung is gleich mA x kV Zum Beispiel: 70 kV x 300 mA = 21 kW.
2. Belichtungen von weniger als .010 Sekunden haben die gleichen kW Werte wie die von .010 Sekunden.

Nota:
1. (kW) De exposición se calcula multiplicando mA x kV-por ejemplo: 70 kV x 300 mA = 21 kW.
2. Para exposiciones de menos de .010 segundos, el resultado en (kW) seria lo mismo que el de .010 segundos.

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 anode de 70%. IEC 60613

0.6 Focal Spot 3Ø 15 Degrees 150/180 Hz
0,6 Dimension Focale 3Ø 15 Degrés 150/180 Hz
0.6 Brennfleck 3Ø 15 Grad 150/180 Hz
0.6 De Marca Focal 3Ø 15 Grados 150/180 Hz

Caractéristoques Pour L'Angiographie CEI 60613
Angiographische Nennleistungen IEC 60613
Gradaciones Angiografica IEC 60613

Exposure rate per second	Tube load (kW) as a function of the exposure time (seconds) of the individual radiographs of the series															Number of exposures in series
	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.225	0.250	
1	28.8	27.6	26.6	25.8	25.1	24.4	23.3	22.3	21.4	20.6	19.9	19.2	18.6	17.9	17.3	
2	28.6	27.2	26.1	25.2	24.3	23.6	22.3	21.1	20.1	19.2	18.4	17.7	17.1	16.3	15.6	
3	28.5	26.9	25.7	24.7	23.8	23.0	21.5	20.3	19.2	18.3	17.5	16.7	—	—	—	
4	28.3	26.7	25.4	24.3	23.3	22.5	21.0	19.7	18.6	17.6	—	—	—	—	—	10
8	28.0	26.1	24.6	23.4	22.3	21.3	—	—	—	—	—	—	—	—	—	
15	27.6	25.5	23.8	22.3	—	—	—	—	—	—	—	—	—	—	—	
30	27.1	24.5	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	28.5	27.0	25.8	24.8	23.9	23.2	21.8	20.6	19.5	18.6	17.8	17.0	16.3	15.6	14.9	
2	28.2	26.5	25.2	24.0	23.0	22.1	20.5	19.2	18.1	17.1	16.2	15.4	14.7	13.9	13.2	
3	28.0	26.1	24.6	23.4	22.3	21.3	19.6	18.2	17.0	16.0	15.1	14.3	—	—	—	
4	27.8	25.8	24.2	22.9	21.7	20.6	18.9	17.4	16.2	15.2	—	—	—	—	—	20
8	27.3	24.8	22.9	21.4	20.0	18.9	—	—	—	—	—	—	—	—	—	
15	26.7	23.9	21.7	20.0	—	—	—	—	—	—	—	—	—	—	—	
30	25.8	22.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	28.0	26.1	24.6	23.3	22.2	21.2	19.5	18.1	16.9	15.9	15.0	14.2	13.5	12.2	11.0	
2	27.7	25.5	23.8	22.4	21.2	20.1	18.3	16.8	15.6	14.5	13.6	12.8	12.1	11.3	10.6	
3	27.4	25.0	23.2	21.7	20.4	19.2	17.3	15.8	14.5	13.5	12.6	11.8	—	—	—	
4	27.1	24.6	22.7	21.1	19.7	18.5	16.6	15.0	13.7	12.7	—	—	—	—	—	40
8	26.3	23.3	21.1	19.2	17.7	16.5	—	—	—	—	—	—	—	—	—	
15	25.4	21.9	19.3	17.3	—	—	—	—	—	—	—	—	—	—	—	
30	24.2	20.2	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	27.5	25.3	23.5	22.1	20.8	19.7	17.8	16.3	15.0	13.1	11.5	10.2	9.2	8.1	7.3	
2	27.2	24.7	22.7	21.1	19.8	18.6	16.7	15.1	13.8	12.8	11.5	10.2	9.2	8.1	7.3	
3	26.8	24.2	22.1	20.4	19.0	17.8	15.8	14.2	12.9	11.9	11.0	10.2	—	—	—	
4	26.6	23.7	21.5	19.8	18.3	17.0	15.0	13.4	12.2	11.1	—	—	—	—	—	60
8	25.6	22.3	19.8	17.9	16.3	15.0	—	—	—	—	—	—	—	—	—	
15	24.5	20.6	17.9	15.8	—	—	—	—	—	—	—	—	—	—	—	
30	23.0	18.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	27.1	24.5	22.6	20.9	19.6	18.4	16.4	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	
2	26.7	23.9	21.8	20.1	18.6	17.4	15.4	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	
3	26.4	23.4	21.1	19.3	17.8	16.6	14.5	12.9	11.5	9.8	8.6	7.6	—	—	—	
4	26.1	22.9	20.6	18.7	17.2	15.9	13.8	12.3	11.0	9.8	—	—	—	—	—	80
8	25.1	21.5	18.8	16.8	15.2	13.9	—	—	—	—	—	—	—	—	—	
15	23.8	19.7	16.9	14.8	—	—	—	—	—	—	—	—	—	—	—	
30	22.1	17.5	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	26.7	23.9	21.7	20.0	18.5	17.3	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	
2	26.3	23.2	20.9	19.1	17.6	16.3	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	
3	25.9	22.7	20.3	18.4	16.9	15.6	13.5	11.0	9.2	7.9	6.9	6.1	—	—	—	
4	25.6	22.2	19.7	17.8	16.2	14.9	12.9	11.0	9.2	7.9	—	—	—	—	—	100
8	24.6	20.7	18.0	16.0	14.3	13.0	—	—	—	—	—	—	—	—	—	
15	23.3	18.9	16.0	13.9	—	—	—	—	—	—	—	—	—	—	—	
30	21.5	16.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	25.7	22.3	19.8	17.9	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
2	25.3	21.7	19.1	17.1	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
3	24.9	21.2	18.5	16.5	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	—	—	—	
4	24.6	20.7	18.0	16.0	14.3	12.2	9.2	7.3	6.1	5.2	—	—	—	—	—	150
8	23.5	19.3	16.4	14.3	12.7	11.4	—	—	—	—	—	—	—	—	—	
15	22.1	17.5	14.5	12.4	—	—	—	—	—	—	—	—	—	—	—	
30	20.1	15.1	—	—	—	—	—	—	—	—	—	—	—	—	—	

Note:
1. (kW) of Exposure Equals mA x kV. For Example: 70 kV x 300 mA = 21 kW.
2. Exposures less than .010 seconds will have a kW rating same as .010 seconds.

Remarque:
1. (kW) en exposition égale kV x mA. Par exemple: 70 kV x 300 mA = 21 kW.
2. Les expositions inférieures à 0.010 sec. ent les mémes valuers en kW que celles de 0.010 sec.

Anmerkungen:
1. (kW) der Belichtung is gleich mA x kV Zum Beispiel: 70 kV x 300 mA = 21 kW.
2. Belichtungen von weniger als .010 Sekunden haben die gleichen kW Werte wie die von .010 Sekunden.

Nota:
1. (kW) De exposición se calcula multiplicando mA x kV-por ejemplo: 70 kV x 300 mA = 21 kW.
2. Para exposiciones de menos de .010 segundos, el resultado en (kW) seria lo mismo que el de .010 segundos.

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 anode de 70%. IEC 60613

1.0 Focal Spot 3Ø 15 Degrees 50/60 Hz
1,0 Dimension Focale 3Ø 15 Degrés 50/60 Hz
1.0 Brennfleck 3Ø 15 Grad 50/60 Hz
1.0 De Marca Focal 3Ø 15 Grados 50/60 Hz

Caractéristoques Pour L'Angiographie CEI 60613
Angiographische Nennleistungen IEC 60613
Gradaciones Angiografica IEC 60613

Exposure rate per second	Tube load (kW) as a function of the exposure time (seconds) of the individual radiographs of the series															Number of exposures in series
	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.225	0.250	
1	28.8	28.3	27.5	26.8	26.1	25.5	24.5	23.5	22.7	21.9	21.2	20.6	20.0	19.3	18.7	10
2	28.7	28.1	27.2	26.3	25.6	24.9	23.7	22.7	21.8	20.9	20.1	19.4	18.8	18.0	17.4	
3	28.6	27.9	27.0	26.1	25.3	24.6	23.3	22.2	21.2	20.3	19.5	18.8	—	—	—	
4	28.5	27.8	26.8	25.8	25.0	24.3	22.9	21.8	20.7	19.8	—	—	—	—	—	
8	28.3	27.4	26.2	25.1	24.2	23.3	—	—	—	—	—	—	—	—	—	
15	28.0	26.9	25.5	24.3	—	—	—	—	—	—	—	—	—	—	—	
30	27.6	26.2	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	28.5	27.7	26.7	25.8	24.9	24.1	22.8	21.6	20.6	19.7	18.8	18.1	17.4	16.6	15.9	20
2	28.3	27.4	26.2	25.1	24.1	23.3	21.8	20.5	19.4	18.4	17.5	16.7	15.9	15.1	14.4	
3	28.1	27.1	25.8	24.6	23.6	22.7	21.1	19.7	18.5	17.5	16.6	15.7	—	—	—	
4	28.0	26.8	25.5	24.2	23.2	22.2	20.5	19.1	17.9	16.8	—	—	—	—	—	
8	27.7	26.2	24.7	23.3	22.1	21.0	—	—	—	—	—	—	—	—	—	
15	27.3	25.5	23.7	22.2	—	—	—	—	—	—	—	—	—	—	—	
30	26.7	24.5	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	28.0	26.8	25.4	24.1	23.0	22.0	20.4	18.9	17.7	16.6	15.7	14.9	13.8	12.2	11.0	40
2	27.7	26.3	24.7	23.3	22.1	21.1	19.2	17.7	16.5	15.4	14.4	13.6	12.9	12.0	11.0	
3	27.5	25.9	24.2	22.7	21.4	20.3	18.4	16.9	15.6	14.5	13.5	12.7	—	—	—	
4	27.3	25.5	23.7	22.2	20.9	19.7	17.8	16.2	14.9	13.8	—	—	—	—	—	
8	26.7	24.6	22.5	20.8	19.4	18.1	—	—	—	—	—	—	—	—	—	
15	26.2	23.7	21.4	19.5	—	—	—	—	—	—	—	—	—	—	—	
30	25.4	22.4	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	27.5	25.9	24.2	22.8	21.5	20.4	18.5	16.9	15.3	13.1	11.5	10.2	9.2	8.1	7.3	60
2	27.2	25.4	23.5	21.9	20.6	19.4	17.4	15.8	14.5	13.1	11.5	10.2	9.2	8.1	7.3	
3	26.9	24.9	23.0	21.3	19.9	18.6	16.6	15.0	13.7	12.6	11.5	10.2	—	—	—	
4	26.7	24.6	22.5	20.7	19.3	18.0	16.0	14.4	13.0	12.0	—	—	—	—	—	
8	26.0	23.4	21.1	19.2	17.6	16.3	—	—	—	—	—	—	—	—	—	
15	25.3	22.3	19.7	17.7	—	—	—	—	—	—	—	—	—	—	—	
30	24.4	20.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	27.1	25.1	23.2	21.6	20.2	19.0	17.0	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	80
2	26.7	24.6	22.5	20.8	19.3	18.1	16.0	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	
3	26.5	24.1	21.9	20.1	18.6	17.3	15.2	13.6	11.5	9.8	8.6	7.6	—	—	—	
4	26.2	23.7	21.4	19.6	18.0	16.7	14.6	13.0	11.5	9.8	—	—	—	—	—	
8	25.5	22.5	20.0	18.0	16.4	15.0	—	—	—	—	—	—	—	—	—	
15	24.6	21.2	18.5	16.4	—	—	—	—	—	—	—	—	—	—	—	
30	23.5	19.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	26.6	24.4	22.3	20.5	19.1	17.8	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	100
2	26.3	23.8	21.6	19.8	18.2	16.9	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	
3	26.0	23.4	21.0	19.1	17.5	16.2	13.8	11.0	9.2	7.9	6.9	6.1	—	—	—	
4	25.7	23.0	20.5	18.6	17.0	15.7	13.5	11.0	9.2	7.9	—	—	—	—	—	
8	24.9	21.7	19.1	17.0	15.4	14.0	—	—	—	—	—	—	—	—	—	
15	24.0	20.3	17.5	15.3	—	—	—	—	—	—	—	—	—	—	—	
30	22.8	18.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	25.6	22.8	20.3	18.3	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	150
2	25.3	22.2	19.7	17.6	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
3	25.0	21.8	19.1	17.1	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	—	—	—	
4	24.7	21.4	18.7	16.6	14.7	12.2	9.2	7.3	6.1	5.2	—	—	—	—	—	
8	23.8	20.1	17.2	15.1	13.4	12.1	—	—	—	—	—	—	—	—	—	
15	22.8	18.6	15.6	13.5	—	—	—	—	—	—	—	—	—	—	—	
30	21.3	16.8	—	—	—	—	—	—	—	—	—	—	—	—	—	

Note:
1. (kW) of Exposure Equals mA x kV. For Example: 70 kV x 300 mA = 21 kW.
2. Exposures less than .010 seconds will have a kW rating same as .010 seconds.

Remarque:
1. (kW) en exposition égale kV x mA. Par exemple: 70 kV x 300 mA = 21 kW.
2. Les expositions inférieures à 0.010 sec. ent les mémes valuers en kW que celles de 0.010 sec.

Anmerkungen:
1. (kW) der Belichtung is gleich mA x kV Zum Beispiel: 70 kV x 300 mA = 21 kW.
2. Belichtungen von weniger als .010 Sekunden haben die gleichen kW Werte wie die von .010 Sekunden.

Nota:
1. (kW) De exposición se calcula multiplicando mA x kV-por ejemplo: 70 kV x 300 mA = 21 kW.
2. Para exposiciones de menos de .010 segundos, el resultado en (kW) seria lo mismo que el de .010 segundos.

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 anode de 70%. IEC 60613

1.0 Focal Spot 3Ø 15 Degrees 150/180 Hz
1,0 Dimension Focale 3Ø 15 Degrés 150/180 Hz
1.0 Brennfleck 3Ø 15 Grad 150/180 Hz
1.0 De Marca Focal 3Ø 15 Grados 150/180 Hz

Caractéristoques Pour L'Angiographie CEI 60613
Angiographische Nennleistungen IEC 60613
Gradaciones Angiografica IEC 60613

Exposure rate per second	Tube load (kW) as a function of the exposure time (seconds) of the individual radiographs of the series														Number of exposures in series
	0.010	0.020	0.030	0.040	0.050	0.060	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.225	0.250	
1	48.9	46.2	44.1	42.3	40.7	39.3	36.9	34.8	33.0	31.5	30.0	28.8	27.6	26.3	25.1	
2	48.5	45.5	43.2	41.2	39.4	37.9	35.2	33.0	31.1	29.4	27.9	26.6	25.4	24.0	22.8	
3	48.3	45.1	42.6	40.5	38.7	37.0	34.2	31.9	29.9	28.2	26.7	25.3	—	—	—	
4	48.1	44.7	42.1	39.9	38.0	36.3	33.5	31.1	29.0	27.3	—	—	—	—	—	10
8	47.5	43.7	40.8	38.3	36.2	34.4	—	—	—	—	—	—	—	—	—	
15	46.8	42.5	39.2	36.4	—	—	—	—	—	—	—	—	—	—	—	
30	45.7	40.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	48.0	44.6	42.0	39.7	37.8	36.1	33.2	30.8	28.7	27.0	25.4	24.1	22.8	21.5	20.3	
2	47.4	43.6	40.6	38.2	36.1	34.2	31.1	28.5	26.4	24.6	23.0	21.6	20.4	19.1	18.0	
3	47.0	42.9	39.7	37.1	34.8	32.9	29.6	27.0	24.8	23.0	21.5	20.1	—	—	—	
4	46.7	42.3	39.0	36.2	33.9	31.9	28.6	25.9	23.7	21.9	—	—	—	—	—	20
8	45.8	40.9	37.2	34.2	31.7	29.5	—	—	—	—	—	—	—	—	—	
15	44.7	39.2	35.1	31.9	—	—	—	—	—	—	—	—	—	—	—	
30	43.1	36.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	46.6	42.1	38.8	36.0	33.6	31.6	28.3	25.6	22.9	19.6	17.2	15.3	13.8	12.2	11.0	
2	45.8	40.9	37.2	34.2	31.7	29.6	26.2	23.5	21.3	19.5	17.2	15.3	13.8	12.2	11.0	
3	45.2	40.0	36.0	32.9	30.3	28.1	24.7	22.0	19.8	18.1	16.6	15.3	—	—	—	
4	44.7	39.2	35.1	31.9	29.2	27.0	23.5	20.8	18.7	17.0	—	—	—	—	—	40
8	43.3	37.0	32.5	29.1	26.4	24.1	—	—	—	—	—	—	—	—	—	
15	41.8	34.9	30.2	26.6	—	—	—	—	—	—	—	—	—	—	—	
30	39.8	32.2	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	45.3	40.1	36.2	33.0	30.5	28.3	22.9	18.3	15.3	13.1	11.5	10.2	9.2	8.1	7.3	
2	44.4	38.8	34.6	31.3	28.7	26.4	22.9	18.3	15.3	13.1	11.5	10.2	9.2	8.1	7.3	
3	43.8	37.8	33.4	30.0	27.3	25.1	21.6	18.3	15.3	13.1	11.5	10.2	—	—	—	
4	43.2	36.9	32.4	29.0	26.2	24.0	20.5	17.9	15.3	13.1	—	—	—	—	—	60
8	41.4	34.4	29.6	26.0	23.3	21.0	—	—	—	—	—	—	—	—	—	
15	39.6	32.0	27.0	23.3	—	—	—	—	—	—	—	—	—	—	—	
30	37.4	29.2	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	44.1	38.2	34.0	30.6	27.5	22.9	17.2	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	
2	43.2	36.9	32.5	29.0	26.3	22.9	17.2	13.8	11.5	9.8	8.6	7.6	6.9	6.1	5.5	
3	42.5	35.9	31.3	27.8	25.0	22.7	17.2	13.8	11.5	9.8	8.6	7.6	—	—	—	
4	41.9	35.0	30.3	26.7	23.9	21.7	17.2	13.8	11.5	9.8	—	—	—	—	—	80
8	40.0	32.5	27.5	23.9	21.1	18.9	—	—	—	—	—	—	—	—	—	
15	37.9	29.8	24.7	21.1	—	—	—	—	—	—	—	—	—	—	—	
30	35.4	26.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	42.9	36.6	32.0	27.5	22.0	18.3	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	
2	42.1	35.3	30.6	27.1	22.0	18.3	13.8	11.0	9.2	7.9	6.9	6.1	5.5	4.9	4.4	
3	41.3	34.3	29.5	25.9	22.0	18.3	13.8	11.0	9.2	7.9	6.9	6.1	—	—	—	
4	40.7	33.4	28.5	24.9	22.0	18.3	13.8	11.0	9.2	7.9	—	—	—	—	—	100
8	38.7	30.9	25.8	22.1	19.4	17.3	—	—	—	—	—	—	—	—	—	
15	36.5	28.1	22.9	19.4	—	—	—	—	—	—	—	—	—	—	—	
30	33.8	25.0	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	40.4	33.0	24.4	18.3	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
2	39.6	31.9	24.4	18.3	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	3.7	3.3	2.9	
3	38.8	31.0	24.4	18.3	14.7	12.2	9.2	7.3	6.1	5.2	4.6	4.1	—	—	—	
4	38.2	30.2	24.4	18.3	14.7	12.2	9.2	7.3	6.1	5.2	—	—	—	—	—	150
8	36.1	27.7	22.5	18.3	14.7	12.2	—	—	—	—	—	—	—	—	—	
15	33.7	24.9	19.9	16.5	—	—	—	—	—	—	—	—	—	—	—	
30	30.7	21.7	—	—	—	—	—	—	—	—	—	—	—	—	—	

Note:
1. (kW) of Exposure Equals mA x kV. For Example: 70 kV x 300 mA = 21 kW.
2. Exposures less than .010 seconds will have a kW rating same as .010 seconds.

Remarque:
1. (kW) en exposition égale kV x mA. Par exemple: 70 kV x 300 mA = 21 kW.
2. Les expositions inférieures à 0.010 sec. ent les mémes valuers en kW que celles de 0.010 sec.

Anmerkungen:
1. (kW) der Belichtung is gleich mA x kV Zum Beispiel: 70 kV x 300 mA = 21 kW.
2. Belichtungen von weniger als .010 Sekunden haben die gleichen kW Werte wie die von .010 Sekunden.

Nota:
1. (kW) De exposición se calcula multiplicando mA x kV-por ejemplo: 70 kV x 300 mA = 21 kW.
2. Para exposiciones de menos de .010 segundos, el resultado en (kW) seria lo mismo que el de .010 segundos.

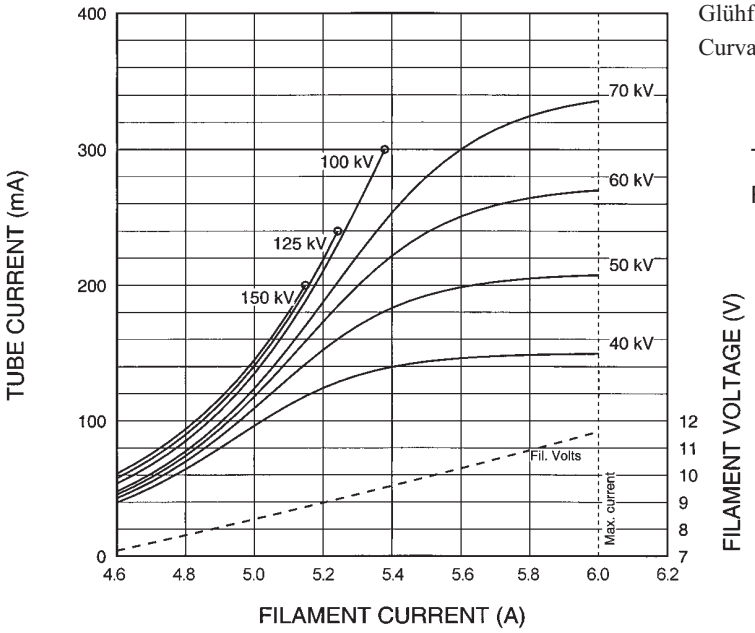
Nominal anode input power for the anode heat content 70%. IEC 60613

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

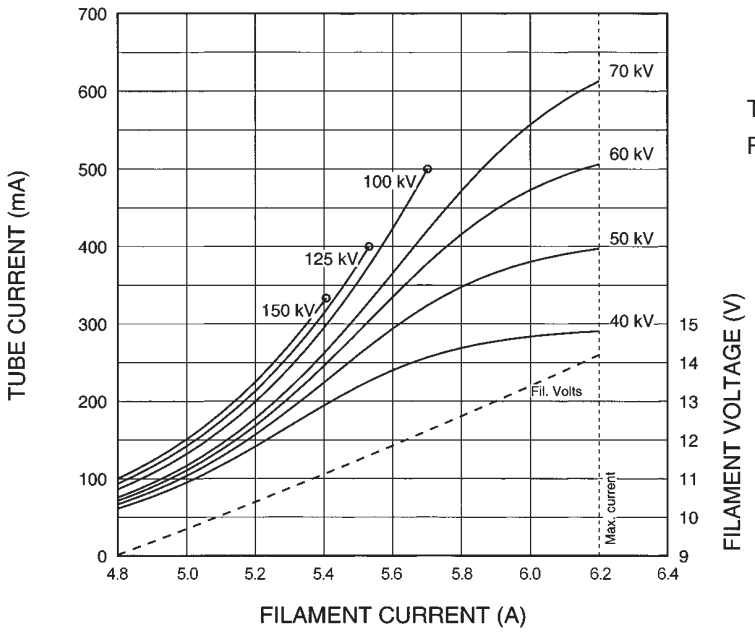
Thermische Anodenbezugsleistung bei einer Wärmespeicherung von 70%. IEC 60613

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

Abaques d' Émissions des Filaments CEI 60613
Glühfadenemissionsdiagramm IEC 60613
Curvas de Emisión de los Filamentos IEC 60613



THREE PHASE EMISSION (± .15 A)
RAD-50 0.6 ■



THREE PHASE EMISSION (± .15 A)
RAD-50 1.0 ■

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.
Remarque:	Lors de l'utilisation de ces abaques pour des expositions d'essai, référez-vous aux courbes maximales de kV, d'émission du filament, de temps d'exposition et de vitesse de rotation.
Anmerkung:	Wenn Sie diese Emissionskurven für Testaufnahmen verwenden, beziehen Sie sich hierbei auf die entsprechenden Nennleistungskurven für max. kV-Werte, Röhrenemission, Heizstrom, und Anodendrehzahl.
Nota:	Si utiliza estas curvas de emisión para exposiciones de prueba, refiérase a las curvas de gradación de potencia para el máximo de kV, tubo de emisión, corriente en los filamentos, tiempo de exposión, y a las curvas de velocidad del objetivo.

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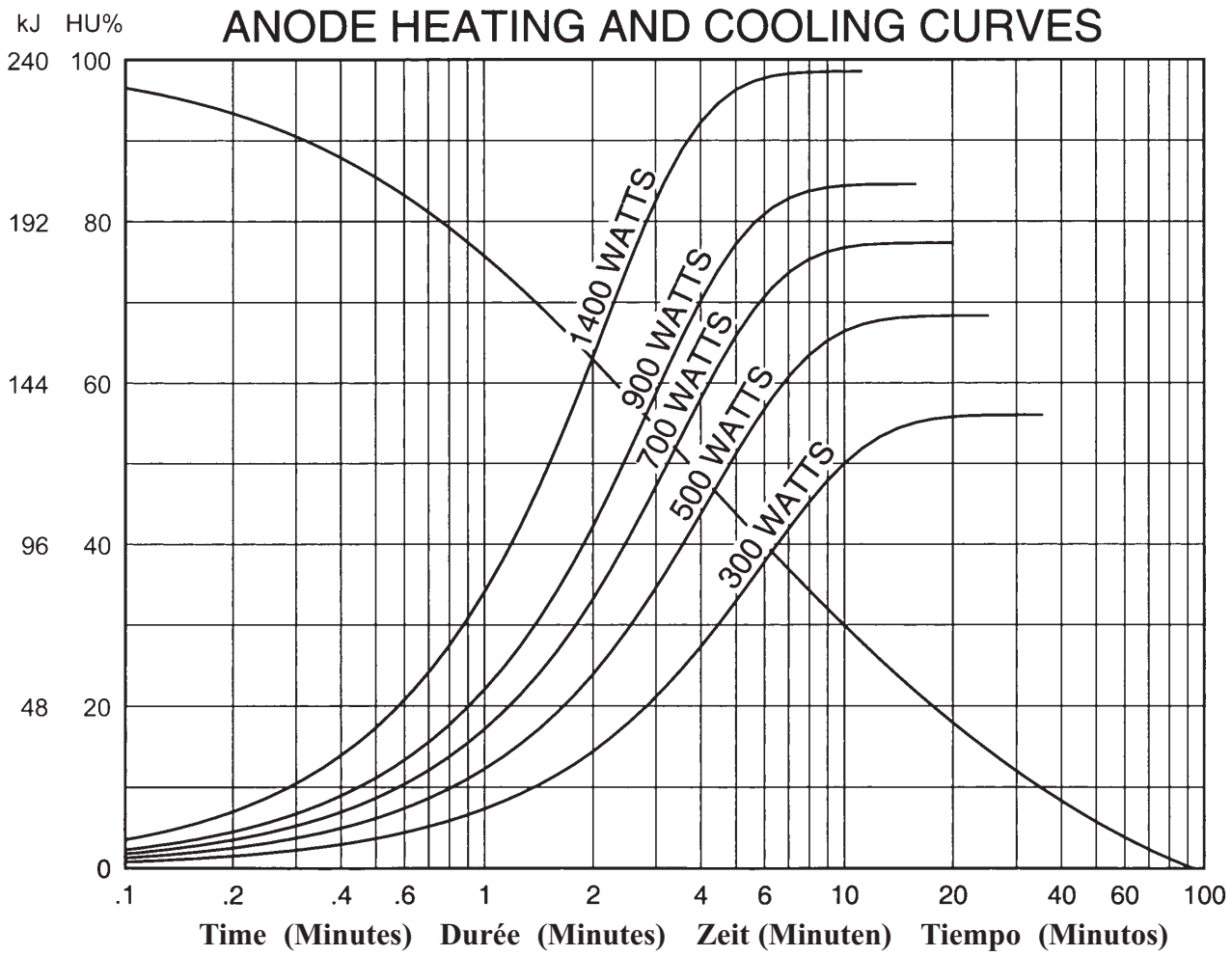
Anode Heating & Cooling Chart

Abaques d' Échauffement et de Refroidissement de L'Anode
Anodenerhitzungs und Kühlungsdiagramm
Curvas de Calentamiento y Enfriamiento del Anodo



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