VARIAN
medical systems

X-RAY PRODUCTS

PG292
Rotating Anode X-Ray Tube

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

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

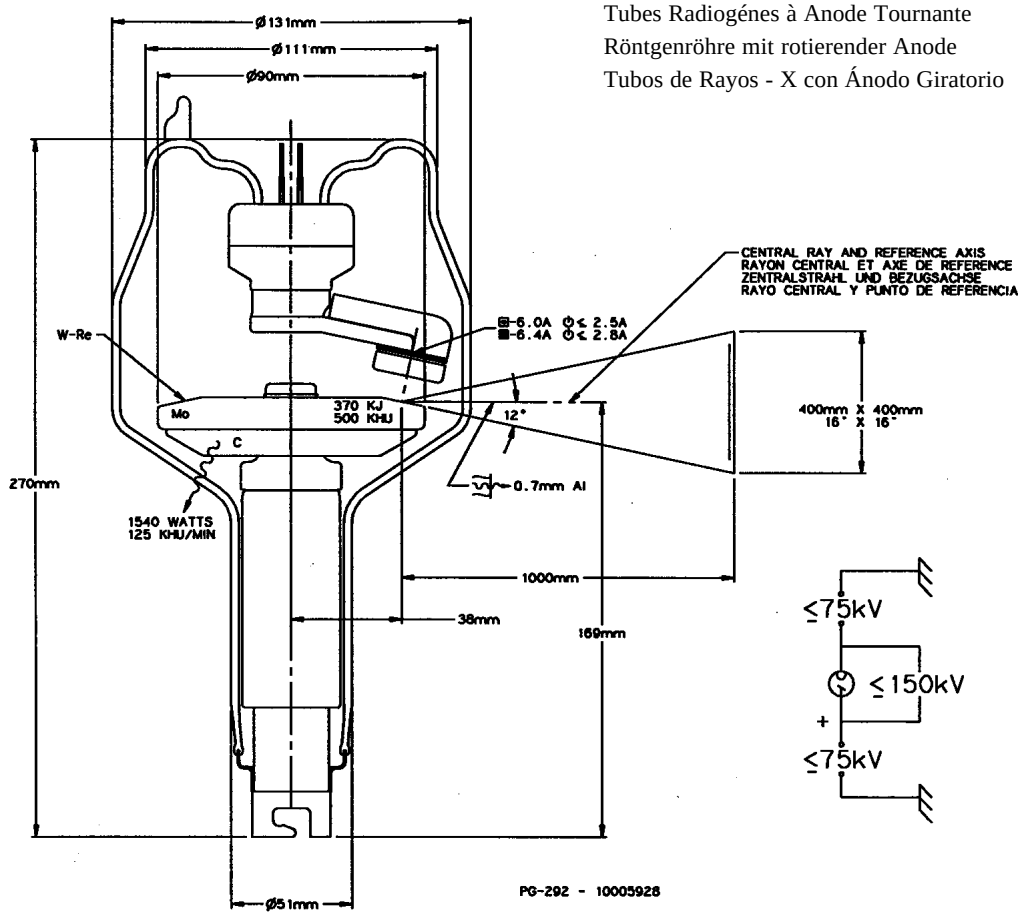
Stand - By
Attente
Bereitschaft
En Espera

Frame or Chasis
Masse
Chassis
Soporte o Chasis

X-Ray Tube
Tube Radiogène
Röntgen Röhre
Tubo de Rayos X

Radiation Filter or Filtration
Filtre de rayonnement
Filterung
Filtración de Radiación

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



Note: Document originally drafted in the English language.

Product Description

The PG292 is a 3.5" (90 mm) 150 kV, 370 kJ (500 kHU) maximum anode heat content, rotating anode insert. This insert is specifically designed for general radiography, cineradiography, digital and film screen angiography procedures. The insert features a 12° rhenium-tungsten facing on molybdenum with a graphite backed target and is available with the following nominal focal spots:

0.6 x 1.2
IEC 336 (1993)

This insert is intended for use in Philips ROT™ housings.

Description du Produit

Le tube PG292, à anode tournante de 90 mm, (3,5 pouces), 150 kV, avec une capacité calorifique maximale de 370 kJ (500 kUC) espécialement conçue pour les procédures radiographie générale, cinéradiographie et angiographie numériques et sur film. L'tube est pourvu d'une anode avec pente de 12° en rhènium - tungsténe sur une base de molybdéne et avec un doublage ge graphite. Il est disponible avec les foyers suivantes:

0,6 x 1,2
CEI 336 (1993)

Ce tube est essentiellement destiné à être employé dans les gaines Philips ROT™.

Produktbeschreibung

Die PG292 ist eine 3.5" (90 mm) Doppelfokus Drehanoden-Röntgenröhre, mit einer Anoden Wärmespeicherkapazität von 370 kJ (500 kHU) und einer max. Spannungsfestigkeit von 150 kV. Die Röhre ist spezielle für den Radiographie-, Röntgenkinematographie-, digitale und Filmangiographieverfahren entwickelt. Der rückseitig mit graphit beschichtete Rhenium-Wolfram- und Molybdän Anodenteller besitzt einen Winkel von 12°. Folgende Brennfleckkombination sind lieferbar:

0.6 x 1.2
IEC 336 (1993)

Die Röntgenröhre ist für den Einbau in die Philips ROT™ vorgesehen.

Descripcion del Producto

El PG292 es un tubo de ánodo giratorio de 90 mm (3.5"), 150 kV, 370 kJ (500 kHU) diseñado especificamente para procedimientos generales de radiografía, cineradiografía, digital, y angiografía con pelicula de pantalla. El blanco emisor es una combinación de renio, tungsteno y molibdeno con grafito en la parte posterior con un rayo central de 12 grados. Disponible con las siguientes combinaciones de marcas focales:

0.6 x 1.2
IEC 336 (1993)

Este tubo es diseñado, para uso en los encajes Philips ROT™.

5093 Rev 4 11/99

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

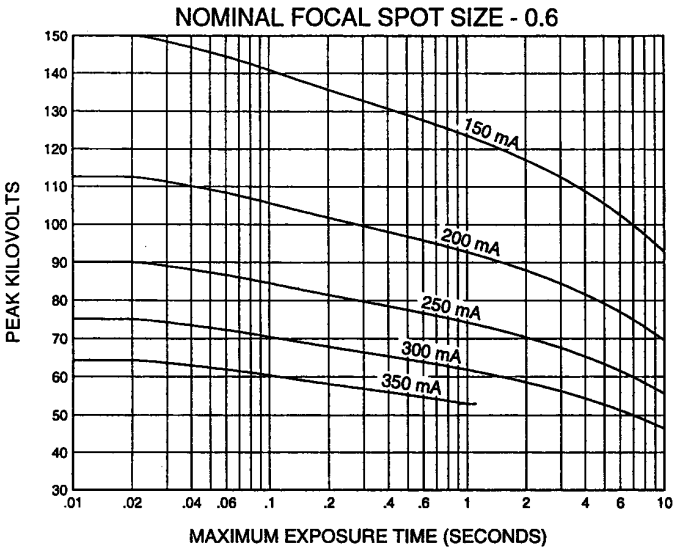
Specifications subject to change without notice.
Spécifications susceptibles d'être modifiées sans préavis.
Technische Daten ohne Gewähr.
Especificaciones sujetas a cambio sin previo aviso.

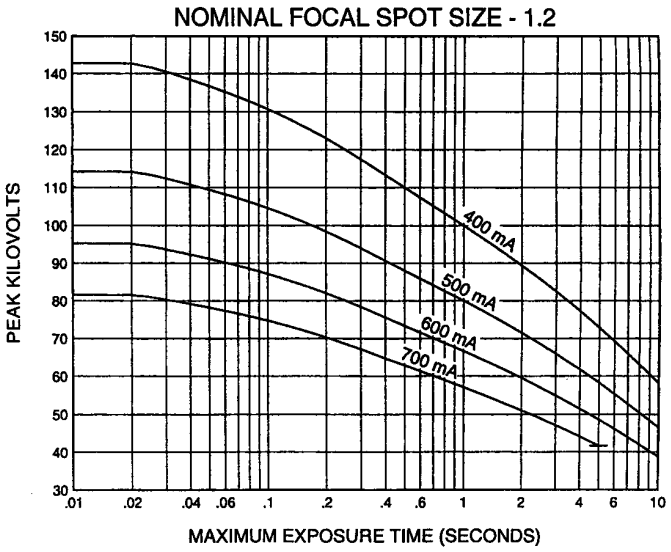
Abaques de Chargepour Pose Unique CEI 613/1989 Brennfleck - Belastungskurven IEC 613/1989 Diagramas de Exposición Radiográfica IEC 613/1989

3 Ø Constant Potential ⎓

50 HZ

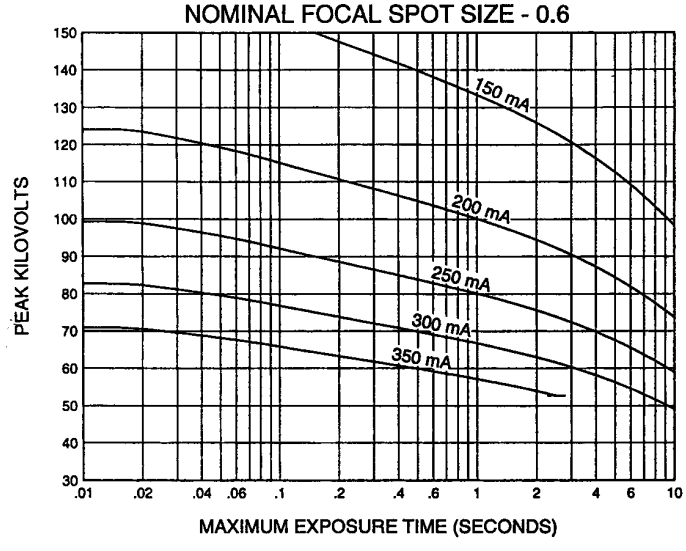
0.6 ▣ **1.2** ■

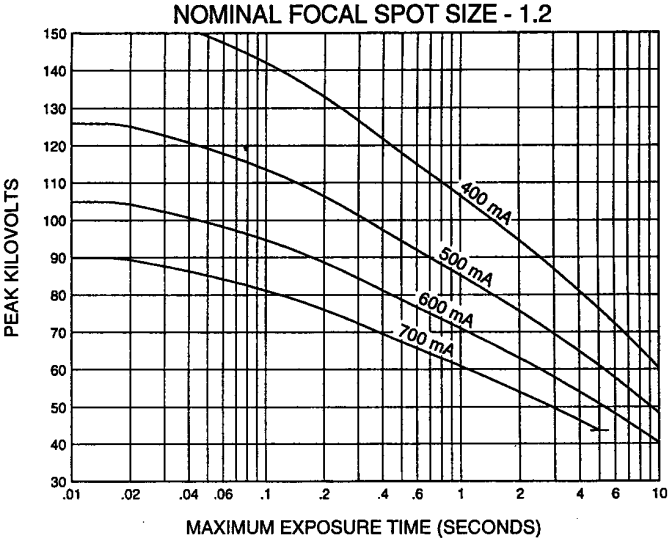




60 HZ

0.6 ▣ **1.2** ■





Nominal anode input power for the anode heat content 40%. IEC 613/1989	Puissance calorifique nominale de l'anode: 40%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 40%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 613/1989

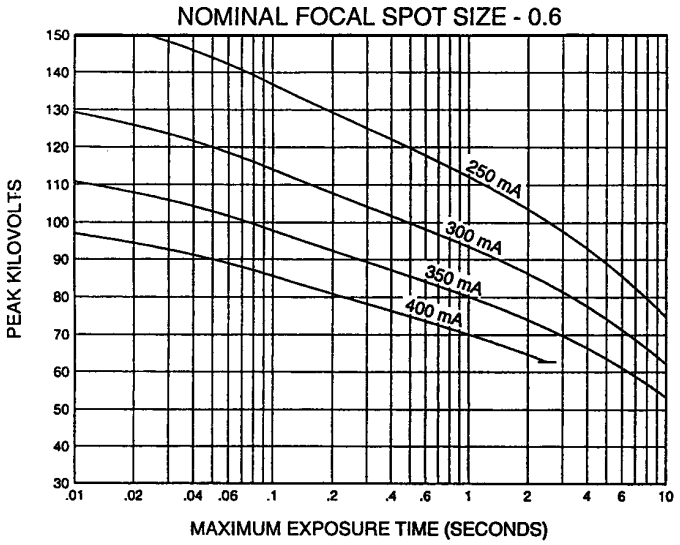
Abaques de Chargepour Pose Unique CEI 613/1989 Brennfleck - Belastungskurven IEC 613/1989 Diagramas de Exposición Radiográfica IEC 613/1989

3 Ø Constant Potential

150 HZ

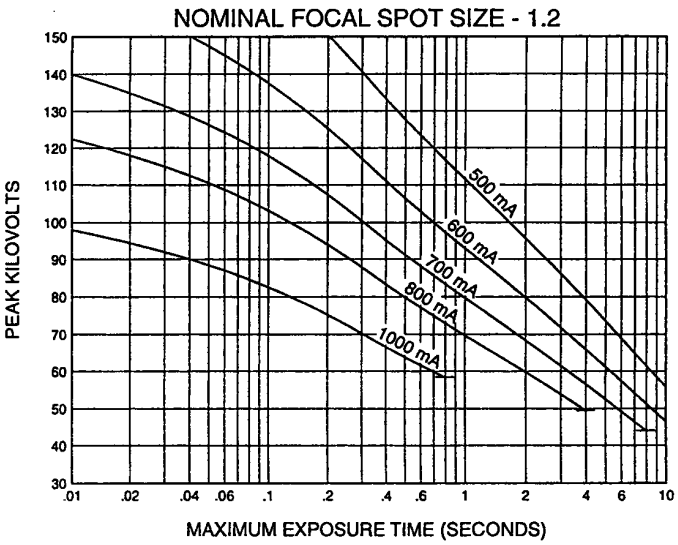
0.6 ▣

34 kW @ 0.1 s (per IEC 613/1989)



1.2 ■

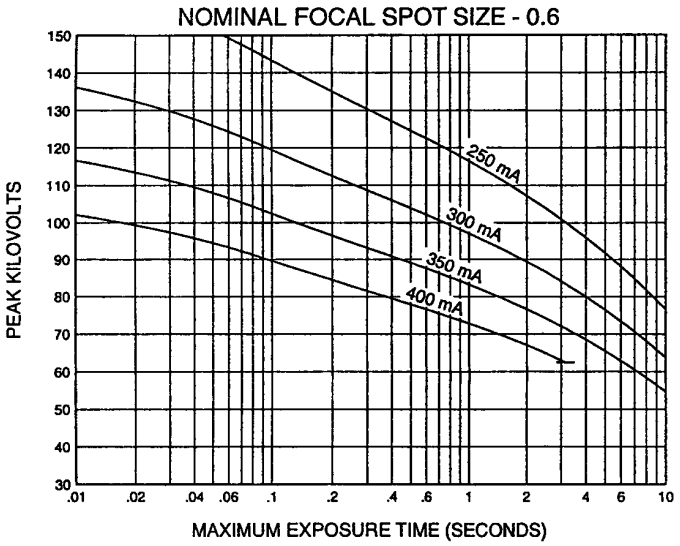
83 kW @ 0.1 s (per IEC 613/1989)



180 HZ

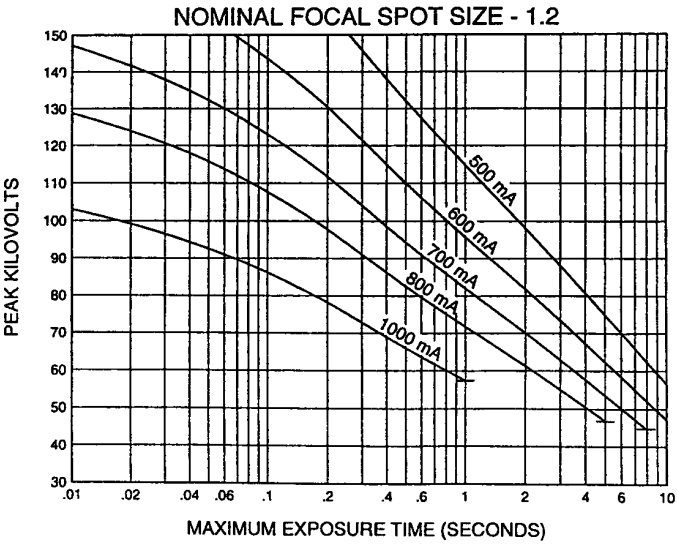
0.6 ▣

36 kW @ 0.1 s (per IEC 613/1989)



1.2 ■

85 kW @ 0.1 s (per IEC 613/1989)



Nominal anode input power for the anode heat content 40%. IEC 613/1989	Puissance calorifique nominale de l'anode: 40%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 40%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 40%. IEC 613/1989

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 for 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 4 msec pulse width and 60 exposures per second the x-ray tube will be producing x-rays for a total of 240 msec each second or 24% 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

$$\frac{80{,}000\ V \times 400\ mA}{1000} = 32{,}000\ W \text{ or } 32\ kW$$

USING THE CINE RATING CHARTS:

PG292 150/180 HZ 3 Phase 1.2 Focal Spot

Example: Determine maximum kW allowed with the following known factors:
Maximum Pulse Width .....4 msec
Exposures per Second 60
Maximum Cine Run Time ... 10 seconds

Calculate Duty Factor: (DF%)

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

$$DF\% = \frac{4msec \times 60\ exp/sec}{10} = \frac{240}{10} = 24\%$$

Refer to Rating Chart PG292 150/180 HZ 3 Phase 1.2 Focal Spot:

At bottom of chart find 10 second line. Move vertically to intersection with 25% DF curve. Make a horizontal reference to left side of rating chart and note kW rating of 45 kW.

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

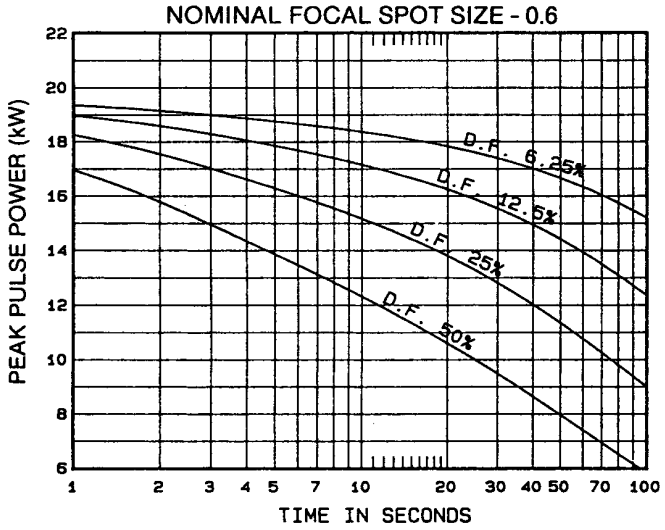
The Cine rating charts are usable to 100% anode heat storage. Exceeding 100% anode heat storage will cause anode track erosion with a high risk of tube destruction.

3 Ø Constant Potential ⎓

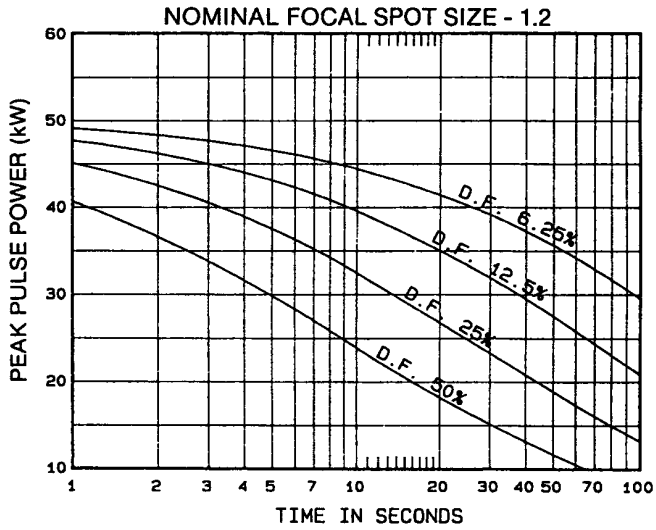
Abaques d'Expositions CEI 613/1989
Belastungskurven IEC 613/1989
Diagramas de Exposición IEC 613/1989

50/60 HZ

0.6 ▣

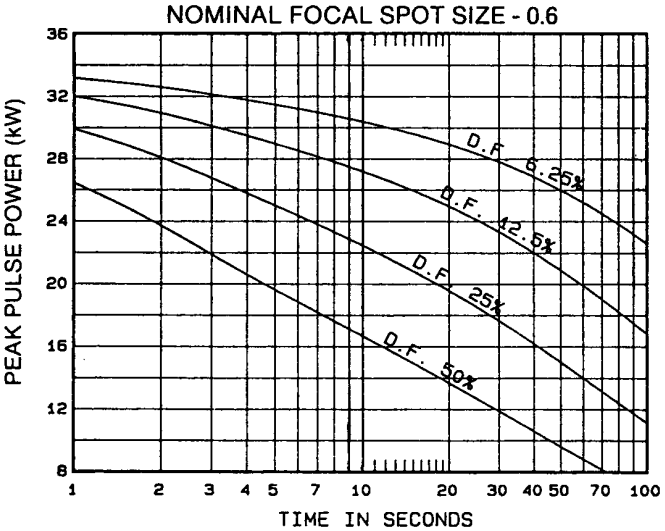


1.2 ■

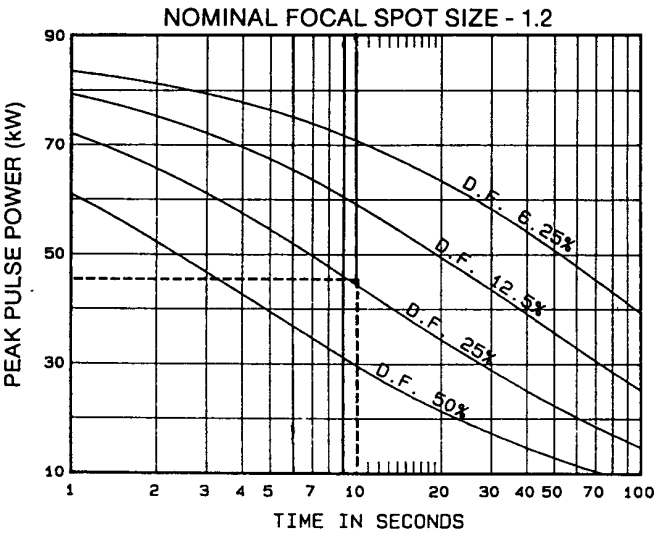


150/180 HZ

0.6 ▣



1.2 ■



Nominal anode input power for the anode heat content 70%. IEC 613/1989	Puissance calorifique nominale de l'anode: 70%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 70%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 613/1989

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 a 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:

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 PG292 150/180 HZ 3 Phase 1.2 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 47.5 kW.

0.6 Focal Spot 3Ø 12 Degrees 50/60 Hz
0,6 Dimension Focale 3Ø 12 Degrés 50/60 Hz
0.6 Brennpunkt 3Ø 12 Grad 50/60 Hz
0.6 De Marcas Focales 3Ø 12 Grados 50/60 Hz

Caractéristiques Pour L'Angiographie CEI 613/1989
Angiographische Nennleistungen IEC 613/1989
Gradaciones Angiografica IEC 613/1989

EXPOSURE RATE PER SECOND	TUBE LOAD (kW) AS A FUNCTION OF THE EXPOSURE TIME (SEC.) 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	19.1	19.1	18.8	18.5	18.3	18.1	17.7	17.4	17.1	16.8	16.6	16.3	16.1	15.9	15.7	
2	19.1	19.0	18.7	18.4	18.2	17.9	17.5	17.1	16.8	16.5	16.3	16.0	15.8	15.6	15.3	
3	19.1	19.0	18.6	18.3	18.0	17.8	17.4	17.0	16.6	16.3	16.0	15.8	—	—	—	
4	19.1	18.9	18.5	18.2	17.9	17.7	17.2	16.8	16.4	16.1	—	—	—	—	—	10
8	19.0	18.7	18.3	17.9	17.5	17.2	—	—	—	—	—	—	—	—	—	
15	18.8	18.4	17.8	17.4	—	—	—	—	—	—	—	—	—	—	—	
30	18.5	17.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	19.1	18.9	18.6	18.2	18.0	17.7	17.2	16.8	16.4	16.1	15.8	15.5	15.2	14.9	14.6	
2	19.0	18.9	18.5	18.1	17.8	17.5	17.0	16.6	16.2	15.8	15.5	15.2	14.9	14.5	14.2	
3	19.0	18.8	18.4	18.0	17.7	17.4	16.8	16.3	15.9	15.5	15.2	14.8	—	—	—	
4	19.0	18.7	18.3	17.9	17.6	17.2	16.6	16.1	15.7	15.3	—	—	—	—	—	20
8	18.9	18.5	18.0	17.5	17.1	16.7	—	—	—	—	—	—	—	—	—	
15	18.6	18.1	17.4	16.8	—	—	—	—	—	—	—	—	—	—	—	
30	18.3	17.5	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	19.0	18.7	18.2	17.8	17.4	17.1	16.4	15.9	15.4	14.9	14.5	14.1	13.8	13.4	13.0	
2	18.9	18.6	18.1	17.7	17.3	16.9	16.2	15.6	15.1	14.6	14.2	13.8	13.4	13.0	12.6	
3	18.9	18.5	18.0	17.5	17.1	16.7	16.0	15.4	14.8	14.3	13.9	13.4	—	—	—	
4	18.8	18.5	17.9	17.4	16.9	16.5	15.8	15.1	14.6	14.0	—	—	—	—	—	40
8	18.7	18.2	17.5	16.9	16.4	15.9	—	—	—	—	—	—	—	—	—	
15	18.4	17.7	16.9	16.2	—	—	—	—	—	—	—	—	—	—	—	
30	18.0	16.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	18.8	18.4	17.9	17.4	16.9	16.5	15.7	15.1	14.5	13.9	13.4	13.0	12.6	12.1	11.7	
2	18.8	18.4	17.8	17.2	16.7	16.3	15.5	14.8	14.2	13.6	13.1	12.7	12.2	11.8	11.3	
3	18.7	18.3	17.7	17.1	16.6	16.1	15.3	14.6	13.9	13.3	12.8	12.4	—	—	—	
4	18.7	18.2	17.5	17.0	16.4	15.9	15.1	14.3	13.7	13.1	—	—	—	—	—	60
8	18.5	17.9	17.1	16.5	15.8	15.3	—	—	—	—	—	—	—	—	—	
15	18.3	17.4	16.5	15.7	—	—	—	—	—	—	—	—	—	—	—	
30	17.8	16.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	18.7	18.2	17.6	17.0	16.4	15.9	15.1	14.3	13.6	13.1	12.5	12.0	11.6	10.3	9.2	
2	18.7	18.1	17.4	16.8	16.3	15.8	14.9	14.1	13.4	12.8	12.2	11.7	11.3	10.3	9.2	
3	18.6	18.0	17.3	16.7	16.1	15.6	14.6	13.8	13.1	12.5	12.0	11.5	—	—	—	
4	18.6	18.0	17.2	16.5	15.9	15.4	14.4	13.6	12.9	12.3	—	—	—	—	—	80
8	18.4	17.7	16.8	16.0	15.4	14.8	—	—	—	—	—	—	—	—	—	
15	18.1	17.1	16.1	15.3	—	—	—	—	—	—	—	—	—	—	—	
30	17.6	16.3	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	18.6	18.0	17.3	16.6	16.0	15.4	14.5	13.7	12.9	12.3	11.6	10.3	9.2	8.2	7.4	
2	18.5	17.9	17.1	16.4	15.8	15.3	14.3	13.4	12.7	12.0	11.4	10.3	9.2	8.2	7.4	
3	18.5	17.8	17.0	16.3	15.7	15.1	14.1	13.2	12.4	11.8	11.2	10.3	—	—	—	
4	18.5	17.7	16.9	16.2	15.5	14.9	13.9	13.0	12.2	11.6	—	—	—	—	—	100
8	18.3	17.4	16.5	15.7	14.9	14.3	—	—	—	—	—	—	—	—	—	
15	18.0	16.9	15.8	14.9	—	—	—	—	—	—	—	—	—	—	—	
30	17.5	16.0	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	18.3	17.5	16.5	15.7	15.0	14.3	13.2	12.2	10.3	8.8	7.7	6.9	6.2	5.5	4.9	
2	18.3	17.4	16.4	15.6	14.8	14.2	13.0	12.0	10.3	8.8	7.7	6.9	6.2	5.5	4.9	
3	18.2	17.3	16.3	15.4	14.7	14.0	12.8	11.8	10.3	8.8	7.7	6.9	—	—	—	
4	18.2	17.2	16.2	15.3	14.5	13.8	12.6	11.7	10.3	8.8	—	—	—	—	—	150
8	18.0	16.9	15.8	14.8	14.0	13.2	—	—	—	—	—	—	—	—	—	
15	17.7	16.4	15.1	14.1	—	—	—	—	—	—	—	—	—	—	—	
30	17.1	15.4	—	—	—	—	—	—	—	—	—	—	—	—	—	

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-porejemplo: 70 kV x 300 mA = 21 kW.
2. Para Exposicione de Menos de .010 segundos, el resultado en (kW) seria lomismo que el de .010 segundos.

Nominal anode input power for the anode heat content 70%. IEC 613/1989

Puissance calorifique nominale de l'anode: 70%, CEI 613/1989

Thermische Anoden bezugsleistung für eine speicherung von 70%. IEC 613/1989

Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 613/1989

1.2 Focal Spot 3Ø 12 Degrees 50/60 Hz
1,2 Dimension Focale 3Ø 12 Degrés 50/60 Hz
1.2 Brennpunkt 3Ø 12 Grad 50/60 Hz
1.2 De Marcas Focales 3Ø 12 Grados 50/60 Hz

Caractéristiques Pour L'Angiographie CEI 613/1989
Angiographische Nennleistungen IEC 613/1989
Gradaciones Angiografica IEC 613/1989

EXPOSURE RATE PER SECOND	TUBE LOAD (kW) AS A FUNCTION OF THE EXPOSURE TIME (SEC.) 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	48.3	47.7	46.5	45.4	44.4	43.5	42.0	40.6	39.4	38.3	37.3	36.3	35.4	34.4	33.5	
2	48.1	47.4	46.0	44.8	43.7	42.7	41.0	39.5	38.2	37.0	35.9	34.8	33.9	32.8	31.8	
3	47.9	47.0	45.6	44.2	43.1	42.0	40.1	38.5	37.1	35.8	34.6	33.6	—	—	—	
4	47.8	46.8	45.2	43.7	42.5	41.3	39.3	37.6	36.1	34.8	—	—	—	—	—	10
8	47.3	45.9	43.9	42.2	40.7	39.3	—	—	—	—	—	—	—	—	—	
15	46.7	44.7	42.3	40.3	—	—	—	—	—	—	—	—	—	—	—	
30	45.8	43.2	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	47.8	46.9	45.3	43.9	42.6	41.5	39.5	37.8	36.2	34.8	33.6	32.4	31.3	30.1	29.0	
2	47.6	46.5	44.8	43.2	41.8	40.6	38.4	36.6	34.9	33.4	32.1	30.9	29.8	28.5	27.4	
3	47.4	46.1	44.2	42.6	41.1	39.8	37.5	35.5	33.8	32.2	30.8	29.6	—	—	—	
4	47.2	45.7	43.8	42.0	40.4	39.0	36.6	34.5	32.7	31.1	—	—	—	—	—	20
8	46.6	44.6	42.2	40.1	38.2	36.6	—	—	—	—	—	—	—	—	—	
15	45.7	43.0	40.1	37.6	—	—	—	—	—	—	—	—	—	—	—	
30	44.3	40.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	47.0	45.4	43.2	41.3	39.7	38.2	35.6	33.3	31.4	29.7	28.2	25.7	23.1	20.6	18.5	
2	46.8	44.9	42.6	40.6	38.8	37.3	34.5	32.2	30.2	28.5	27.0	25.6	23.1	20.6	18.5	
3	46.5	44.5	42.1	39.9	38.1	36.4	33.6	31.2	29.2	27.4	25.9	24.5	—	—	—	
4	46.3	44.1	41.5	39.3	37.3	35.6	32.7	30.2	28.2	26.4	—	—	—	—	—	40
8	45.6	42.7	39.8	37.2	35.0	33.1	—	—	—	—	—	—	—	—	—	
15	44.5	40.9	37.4	34.5	—	—	—	—	—	—	—	—	—	—	—	
30	42.7	37.9	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	46.3	44.0	41.4	39.1	37.1	35.4	32.4	29.9	25.7	22.0	19.3	17.1	15.4	13.7	12.3	
2	46.0	43.5	40.8	38.4	36.3	34.5	31.4	28.9	25.7	22.0	19.3	17.1	15.4	13.7	12.3	
3	45.8	43.1	40.2	37.7	35.6	33.7	30.6	28.0	25.7	22.0	19.3	17.1	—	—	—	
4	45.5	42.7	39.7	37.1	34.9	33.0	29.7	27.2	25.0	22.0	—	—	—	—	—	60
8	44.7	41.3	37.9	35.0	32.6	30.6	—	—	—	—	—	—	—	—	—	
15	43.5	39.3	35.4	32.3	—	—	—	—	—	—	—	—	—	—	—	
30	41.5	36.1	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	45.6	42.7	39.7	37.1	34.9	33.0	28.9	23.1	19.3	16.5	14.5	12.8	11.6	10.3	9.2	
2	45.3	42.3	39.1	36.4	34.2	32.2	28.9	23.1	19.3	16.5	14.5	12.8	11.6	10.3	9.2	
3	45.0	41.8	38.5	35.8	33.5	31.4	28.1	23.1	19.3	16.5	14.5	12.8	—	—	—	
4	44.8	41.4	38.0	35.2	32.8	30.8	27.4	23.1	19.3	16.5	—	—	—	—	—	80
8	43.9	40.0	36.2	33.2	30.7	28.5	—	—	—	—	—	—	—	—	—	
15	42.7	37.9	33.8	30.5	—	—	—	—	—	—	—	—	—	—	—	
30	40.6	34.7	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	44.9	41.5	38.2	35.4	33.0	30.8	23.1	18.5	15.4	13.2	11.6	10.3	9.2	8.2	7.4	
2	44.6	41.1	37.6	34.7	32.3	30.2	23.1	18.5	15.4	13.2	11.6	10.3	9.2	8.2	7.4	
3	44.3	40.6	37.0	34.1	31.6	29.5	23.1	18.5	15.4	13.2	11.6	10.3	—	—	—	
4	44.1	40.2	36.5	33.5	31.0	28.9	23.1	18.5	15.4	13.2	—	—	—	—	—	100
8	43.2	38.8	34.8	31.6	29.0	26.8	—	—	—	—	—	—	—	—	—	
15	41.9	36.8	32.4	29.0	—	—	—	—	—	—	—	—	—	—	—	
30	39.8	33.6	—	—	—	—	—	—	—	—	—	—	—	—	—	
1	43.2	38.8	34.8	30.8	24.7	20.6	15.4	12.3	10.3	8.8	7.7	6.9	6.2	5.5	4.9	
2	43.0	38.4	34.3	30.8	24.7	20.6	15.4	12.3	10.3	8.8	7.7	6.9	6.2	5.5	4.9	
3	42.7	37.9	33.8	30.5	24.7	20.6	15.4	12.3	10.3	8.8	7.7	6.9	—	—	—	
4	42.5	37.6	33.3	30.0	24.7	20.6	15.4	12.3	10.3	8.8	—	—	—	—	—	150
8	41.6	36.2	31.8	28.3	24.7	20.6	—	—	—	—	—	—	—	—	—	
15	40.3	34.3	29.6	26.0	—	—	—	—	—	—	—	—	—	—	—	
30	38.0	31.1	—	—	—	—	—	—	—	—	—	—	—	—	—	

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-porejemplo: 70 kV x 300 mA = 21 kW. 2. Para Exposicione de Menos de .010 segundos, el resultado en (kW) seria lomismo que el de .010 segundos.
Nominal anode input power for the anode heat content 70%. IEC 613/1989	Puissance calorifique nominale de l'anode: 70%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 70%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 613/1989

0.6 Focal Spot 3Ø 12 Degrees 150/180 Hz
0,6 Dimension Focale 3Ø 12 Degrés 150/180 Hz
0.6 Brennpunkt 3Ø 12 Grad 150/180 Hz
0.6 De Marcas Focales 3Ø 12 Grados 150/180 Hz

Caractéristiques Pour L'Angiographie CEI 613/1989
Angiographische Nennleistungen IEC 613/1989
Gradaciones Angiografica IEC 613/1989

EXPOSURE RATE PER SECOND	TUBE LOAD (KW) AS A FUNCTION OF THE EXPOSURE TIME (SEC.) OF THE INDIVIDUAL RADIOGRAPHS OF THE SERIES															NUMBER OF EXPOSURES IN SERIES
	.010	.020	.030	.040	.050	.060	.080	.100	.120	.140	.160	.180	.200	.225	.250	
1	33.1	31.5	30.2	29.1	28.2	27.3	25.7	24.4	23.3	22.2	21.3	20.4	19.7	18.8	18.0	
2	32.8	30.9	29.4	28.1	27.0	26.0	24.2	22.7	21.4	20.3	19.2	18.3	17.5	16.6	15.8	
3	32.5	30.4	28.8	27.4	26.1	25.0	23.1	21.5	20.1	18.9	17.9	16.9	0.0	0.0	0.0	
4	32.3	30.1	28.3	26.7	25.4	24.2	22.2	20.6	19.2	17.9	0.0	0.0	0.0	0.0	0.0	20
8	31.7	29.1	27.0	25.2	23.7	22.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	31.1	28.0	25.6	23.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	30.2	26.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	32.7	30.7	29.1	27.7	26.6	25.5	23.7	22.1	20.8	19.6	18.6	17.6	16.8	15.9	15.1	
2	32.2	29.9	28.1	26.5	25.2	24.0	22.0	20.3	18.8	17.6	16.6	15.6	14.8	13.9	13.1	
3	31.9	29.3	27.3	25.6	24.1	22.8	20.7	18.9	17.5	16.2	15.1	14.2	0.0	0.0	0.0	
4	31.6	28.8	26.6	24.8	23.3	21.9	19.7	17.9	16.4	15.2	0.0	0.0	0.0	0.0	0.0	40
8	30.6	27.3	24.7	22.6	20.9	19.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	29.7	25.8	22.9	20.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	28.4	23.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	32.3	30.0	28.1	26.6	25.3	24.1	22.0	20.4	18.9	17.7	16.7	15.7	14.9	14.0	12.7	
2	31.8	29.1	27.1	25.3	23.8	22.5	20.4	18.6	17.1	15.9	14.8	13.9	13.1	12.2	11.4	
3	31.4	28.5	26.2	24.3	22.7	21.4	19.1	17.3	15.8	14.6	13.5	12.6	0.0	0.0	0.0	
4	31.0	27.9	25.5	23.5	21.8	20.4	18.1	16.3	14.8	13.5	0.0	0.0	0.0	0.0	0.0	60
8	29.9	26.1	23.3	21.1	19.3	17.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	28.6	24.3	21.1	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	27.1	22.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	31.9	29.3	27.3	25.6	24.1	22.8	20.7	18.9	17.5	16.2	14.8	13.2	11.9	10.6	9.5	
2	31.4	28.5	26.2	24.3	22.7	21.4	19.1	17.3	15.8	14.5	13.5	12.6	11.8	10.6	9.5	
3	30.9	27.8	25.3	23.3	21.6	20.2	17.9	16.0	14.5	13.3	12.3	11.4	0.0	0.0	0.0	
4	30.6	27.1	24.5	22.5	20.7	19.2	16.9	15.0	13.6	12.4	0.0	0.0	0.0	0.0	0.0	80
8	29.3	25.3	22.3	20.0	18.2	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	27.9	23.2	19.9	17.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	26.1	20.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	31.5	28.7	26.5	24.7	23.1	21.8	19.5	17.7	15.8	13.6	11.9	10.6	9.5	8.4	7.6	
2	31.0	27.8	25.4	23.4	21.8	20.3	18.0	16.2	14.7	13.5	11.9	10.6	9.5	8.4	7.6	
3	30.5	27.1	24.5	22.4	20.7	19.2	16.8	15.0	13.5	12.3	11.3	10.5	0.0	0.0	0.0	
4	30.1	26.5	23.7	21.6	19.8	18.3	15.9	14.1	12.6	11.5	0.0	0.0	0.0	0.0	0.0	100
8	28.8	24.6	21.5	19.1	17.2	15.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	27.3	22.4	19.0	16.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	25.2	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	30.7	27.3	24.8	22.7	21.0	19.5	15.8	12.7	10.6	9.0	7.9	7.0	6.3	5.6	5.1	
2	30.1	26.5	23.7	21.5	19.7	18.2	15.8	12.7	10.6	9.0	7.9	7.0	6.3	5.6	5.1	
3	29.6	25.7	22.8	20.6	18.7	17.2	14.8	12.7	10.6	9.0	7.9	7.0	0.0	0.0	0.0	
4	29.2	25.1	22.1	19.8	17.9	16.4	14.0	12.3	10.6	9.0	0.0	0.0	0.0	0.0	0.0	150
8	27.8	23.1	19.8	17.4	15.5	14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	26.1	20.8	17.3	14.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	23.7	17.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	28.4	24.0	20.8	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	3.2	2.8	2.5	
2	27.9	23.2	19.9	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	3.2	2.8	2.5	
3	27.4	22.5	19.2	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	0.0	0.0	0.0	
4	27.0	21.9	18.6	15.8	12.7	10.6	7.9	6.3	5.3	4.5	0.0	0.0	0.0	0.0	0.0	300
8	25.5	20.1	16.6	14.2	12.4	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	23.6	17.9	14.4	12.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	21.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

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 multi-plicando mA x kV-porejemplo: 70 kV x 300 mA = 21 kW. 2. Para Exposicione de Menos de .010 segundos, el resultado en (kW) seria lomismo que el de .010 segundos.
Nominal anode input power for the anode heat content 70%. IEC 613/1989	Puissance calorifique nominale de l'anode: 70%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 70%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 613/1989

1.2 Focal Spot 3Ø 12 Degrees 150/180 Hz
1,2 Dimension Focale 3Ø 12 Degrés 150/180 Hz
1.2 Brennpunkt 3Ø 12 Grad 150/180 Hz
1.2 De Marcas Focales 3Ø 12 Grados 150/180 Hz

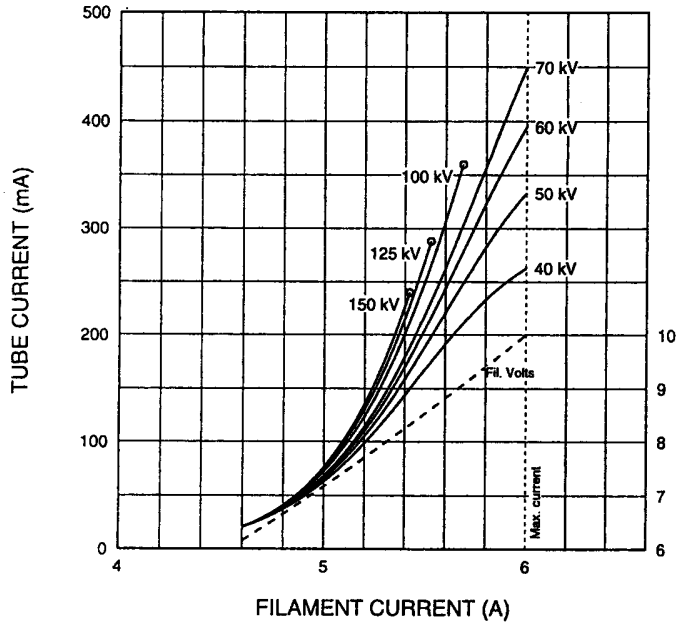
Caractéristiques Pour L'Angiographie CEI 613/1989
Angiographische Nennleistungen IEC 613/1989
Gradaciones Angiografica IEC 613/1989

EXPOSURE RATE PER SECOND	TUBE LOAD (KW) AS A FUNCTION OF THE EXPOSURE TIME (SEC.) OF THE INDIVIDUAL RADIOGRAPHS OF THE SERIES															NUMBER OF EXPOSURES IN SERIES
	.010	.020	.030	.040	.050	.060	.080	.100	.120	.140	.160	.180	.200	.225	.250	
1	82.1	75.5	70.4	66.3	62.7	59.5	54.2	49.9	46.3	43.2	40.5	38.2	36.1	33.9	31.9	
2	81.1	73.8	68.2	63.6	59.7	56.4	50.8	46.3	42.6	39.5	36.8	34.5	32.5	30.2	28.3	
3	80.4	72.6	66.7	61.9	57.9	54.4	48.7	44.1	40.4	37.3	34.6	32.3	0.0	0.0	0.0	
4	79.8	71.7	65.6	60.6	56.4	52.9	47.0	42.4	38.7	35.6	0.0	0.0	0.0	0.0	0.0	20
8	78.1	69.0	62.2	56.8	52.3	48.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	76.0	65.8	58.4	52.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	73.1	61.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	79.4	70.9	64.6	59.5	55.2	51.6	45.7	41.1	37.4	33.9	29.7	26.4	23.8	21.1	19.0	
2	77.8	68.4	61.5	56.1	51.6	47.8	41.8	37.2	33.5	30.5	28.0	26.0	23.8	21.1	19.0	
3	76.6	66.7	59.4	53.8	49.2	45.3	39.3	34.7	31.1	28.2	25.9	23.8	0.0	0.0	0.0	
4	75.8	65.4	58.0	52.2	47.5	43.6	37.6	33.1	29.5	26.7	0.0	0.0	0.0	0.0	0.0	40
8	73.5	62.0	54.0	48.0	43.2	39.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	70.7	58.2	49.8	43.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	66.9	53.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	77.0	67.2	60.1	54.5	49.9	46.1	39.6	31.7	26.4	22.6	19.8	17.6	15.8	14.1	12.7	
2	75.2	64.5	56.9	51.0	46.3	42.4	36.4	31.7	26.4	22.6	19.8	17.6	15.8	14.1	12.7	
3	73.8	62.5	54.5	48.5	43.8	39.9	33.9	29.6	26.2	22.6	19.8	17.6	0.0	0.0	0.0	
4	72.7	61.0	52.8	46.7	41.9	38.0	32.2	27.9	24.6	22.1	0.0	0.0	0.0	0.0	0.0	60
8	69.9	57.1	48.6	42.3	37.6	33.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	66.8	53.1	44.3	38.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	62.6	47.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	74.9	64.0	56.3	50.4	45.7	39.6	29.7	23.8	19.8	17.0	14.8	13.2	11.9	10.6	9.5	
2	72.9	61.2	53.1	47.0	42.2	38.4	29.7	23.8	19.8	17.0	14.8	13.2	11.9	10.6	9.5	
3	71.4	59.2	50.8	44.6	39.8	36.0	29.7	23.8	19.8	17.0	14.8	13.2	0.0	0.0	0.0	
4	70.2	57.5	49.0	42.7	38.0	34.2	28.5	23.8	19.8	17.0	0.0	0.0	0.0	0.0	0.0	80
8	66.9	53.2	44.4	38.2	33.5	29.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	63.6	49.2	40.3	34.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	59.1	44.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	72.9	61.2	53.1	47.0	38.0	31.7	23.8	19.0	15.8	13.6	11.9	10.6	9.5	8.4	7.6	
2	70.9	58.4	50.0	43.8	38.0	31.7	23.8	19.0	15.8	13.6	11.9	10.6	9.5	8.4	7.6	
3	69.3	56.3	47.7	41.5	36.7	31.7	23.8	19.0	15.8	13.6	11.9	10.6	0.0	0.0	0.0	
4	68.0	54.6	45.9	39.6	34.9	31.3	23.8	19.0	15.8	13.6	0.0	0.0	0.0	0.0	0.0	100
8	64.4	50.1	41.2	35.1	30.6	27.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	60.9	46.0	37.1	31.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	56.3	40.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	68.5	55.3	42.2	31.7	25.3	21.1	15.8	12.7	10.6	9.0	7.9	7.0	6.3	5.6	5.1	
2	66.5	52.7	42.2	31.7	25.3	21.1	15.8	12.7	10.6	9.0	7.9	7.0	6.3	5.6	5.1	
3	64.8	50.6	41.8	31.7	25.3	21.1	15.8	12.7	10.6	9.0	7.9	7.0	0.0	0.0	0.0	
4	63.5	49.0	40.1	31.7	25.3	21.1	15.8	12.7	10.6	9.0	0.0	0.0	0.0	0.0	0.0	150
8	59.5	44.4	35.6	29.7	25.3	21.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	55.5	40.1	31.5	26.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	50.7	35.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	58.3	31.7	21.1	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	3.2	2.8	2.5	
2	56.5	31.7	21.1	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	3.2	2.8	2.5	
3	55.0	31.7	21.1	15.8	12.7	10.6	7.9	6.3	5.3	4.5	4.0	3.5	0.0	0.0	0.0	
4	53.7	31.7	21.1	15.8	12.7	10.6	7.9	6.3	5.3	4.5	0.0	0.0	0.0	0.0	0.0	300
8	49.8	31.7	21.1	15.8	12.7	10.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
15	45.5	30.4	21.1	15.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
30	40.5	26.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

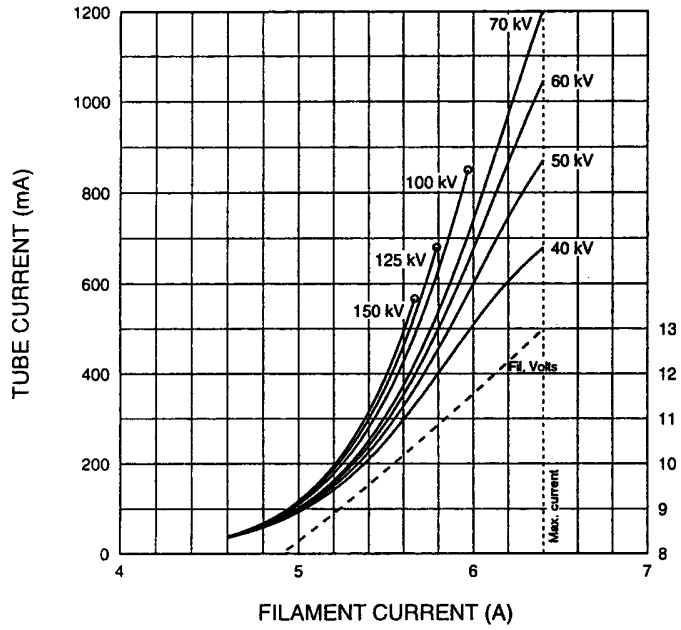
Note: 1. (kW) of Exposure Equals mA x kV. For Example: 70 kV x 300 mA = 21 kW. 2. Exposures less than .010 seconds will have a kW rating same as .010 seconds.	**Remarque:** 1. (kW) en exposition égale kV x mA. Par exemple: 70 kV x 300 mA = 21 kW. 2. Les expositions inférieures à 0.010 sec. ent les mémes 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-porejemplo: 70 kV x 300 mA = 21 kW. 2. Para Exposicione de Menos de .010 segundos, el resultado en (kW) seria lomismo que el de .010 segundos.
Nominal anode input power for the anode heat content 70%. IEC 613/1989	Puissance calorifique nominale de l'anode: 70%, CEI 613/1989	Thermische Anoden bezugsleistung für eine speicherung von 70%. IEC 613/1989	Aproximadamente el poder de penetracion para obtener un almacenaje de calor del anodo de 70%. IEC 613/1989

3 Ø FULL WAVE

Abaques d' Émissions des Filaments CEI 613/1989
Heizfadenemissionsdiagramm IEC 613/1989
Curvas de Emisión de los Filamentos IEC 613/1989



THREE PHASE EMISSION (± .15 A)
PG292 0.6

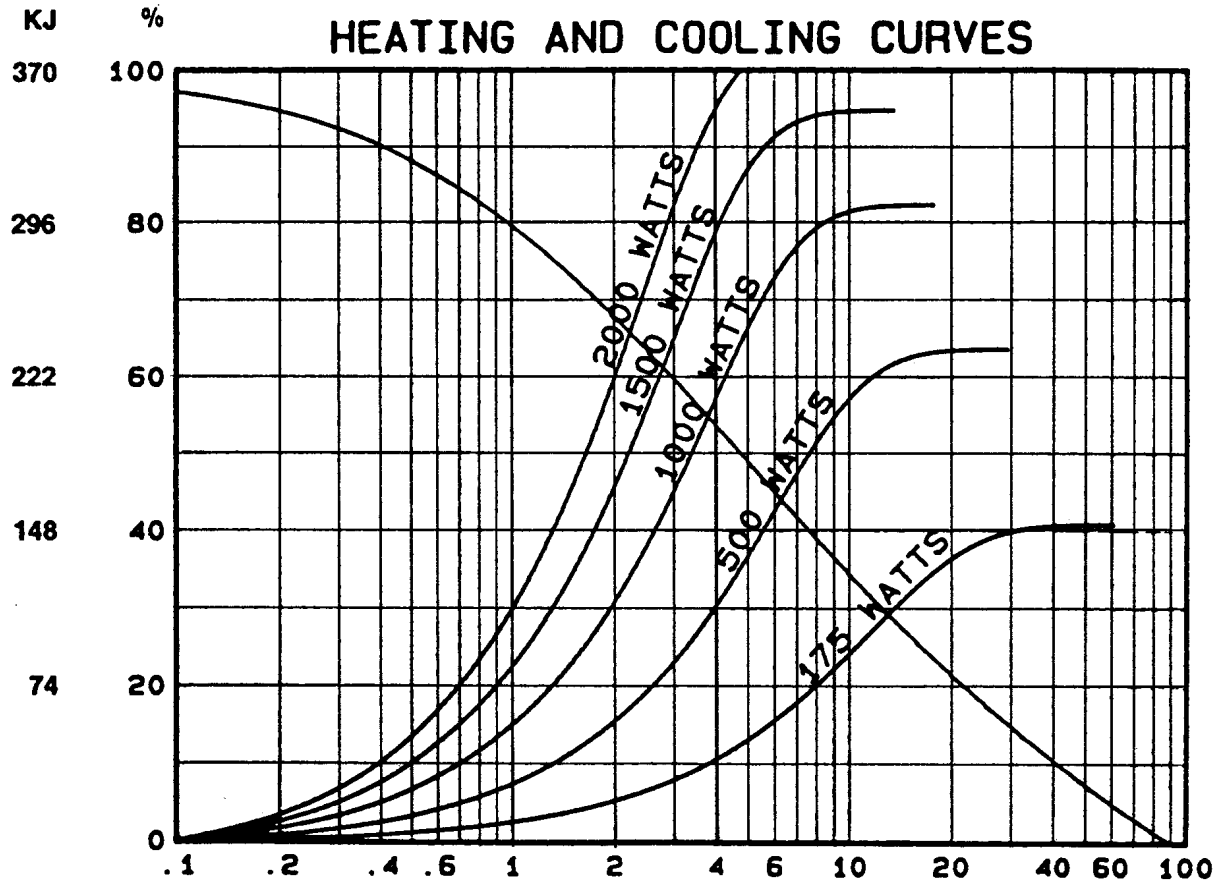


THREE PHASE EMISSION (± .15 A)
PG292 1.2

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.

PG292
Anode Heating & Cooling Chart

Abaques d' Échauffement et de Refroidissement de L'Anode
Anoden Aufheiz - und Abkühlkurven
Curvas de Calentamiento y Enfriamiento del Anodo



Time (Minutes) Durée (Minutes) Zeit (Minuten) Tiempo (Minutos)

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