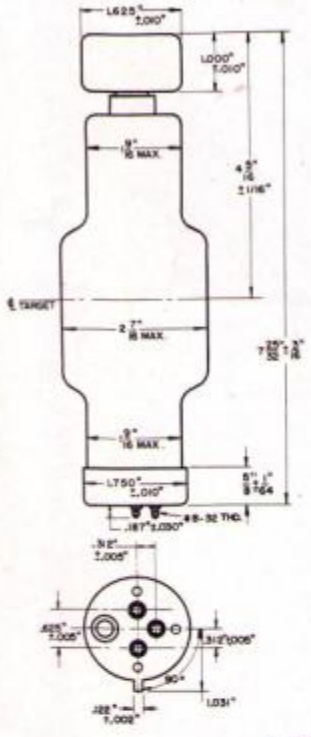
WESTINGHOUSE X-RAY TUBES



OIL INSULATED 100 KV RADIOGRAPHIC X-RAY TUBES

TYPES WL355, 374, 375, 376 & 377

VOLTAGE RATINGS

FULL WAVE RECTIFIED	100KVP
HALF WAVE RECTIFIED	100KVP
SELF RECTIFIED	90KVP USEFUL, 100KVP INVERSE

GENERAL DESIGN INFORMATION

APPLICATION:

These Westinghouse tubes are suitable for application in a variety of oil filled equipments ranging in size from self-contained mobile units to high milliamperage full wave units for techniques as high as 250 ma at 100 kvp.

FOCAL SPOTS:

The 20° line focus feature provides a projected focal spot 1/3 the actual area. Single and double focal spot sizes are listed below.

SINGLE FOCUS TUBES

TUBE TYPE	FOCAL SPOT PROJECTED SIZE
WL374	2.1 mm²
WL375	3.0 mm²
WL376	4.2 mm²

DOUBLE FOCUS TUBES

TUBE TYPE	FOCAL SPOT PROJECTED SIZE
WL377	1.5 & 3.0 mm²
WL355	2.1 & 4.2 mm²

RATING DATA:

VOLTAGE: *See above.* CURRENT: *Maximum ratings given on pages 3 and 4.*

FLUOROSCOPIC: *85kvp, 5ma or 100kvp, 4ma to heat capacity of head.*

ANODE HEAT CAPACITY: *100,000 H.U. See cooling chart on page 2.*

TIME BETWEEN EXPOSURES AT MAXIMUM RATING: *Under 1/10 second—3 seconds, over 1/10 second—5 seconds. In Stereoradiography the total time of the two exposures is to be used as the basis for determining the ratings permitted by the chart. In general the ratings allowed will be 90% of that allowed for a single exposure.*

FRACTIONAL SECOND EXPOSURES:

The possibility of damaging the target during high milliamperage fractional second exposures on a cold tube is greatly minimized if a preliminary "warm up" exposure of about 20,000 H.U. is made at 10 to 15ma. When establishing settings to be used for high ma exposures, in order to avoid damaging the focal spot, care must be exercised not to exceed ratings.

FILAMENT CHARACTERISTICS:

Individual filament settings depend upon the exposure technique used. The range of currents is from 3.5 to 5.5 amperes and the voltage range from 3.5 to 10.0 volts. When taking a series of exposures, tube life is conserved by turning the filament off between exposures unless the next exposure is to follow immediately.

ANODE:

The design and processing of the heavy copper anodes provides maximum conduction of heat from the target, made of Westinghouse tungsten, to the oil.

KOVAR:

Anode seals are made of Westinghouse developed Kovar which has won wide acceptance in the Electronics Industry because of the high degree of quality control exercised in our plants during its manufacture. The use of Kovar provides a rugged construction so that the full thickness of metal is maintained at the edge of the glass seal insuring maximum strength and freedom from leaks through the metal, thus increasing the life expectancy of the tube. This sealing operation is performed by radio frequency.

RADIATOR:

All surfaces of the Radiator and Rod which come in contact with the oil are nickel plated, thus avoiding damage to the oil by chemical reaction with the copper.

GETTER:

The most advanced techniques are used in pretreatment of parts and exhaust but in addition, the use of an efficient getter within a specially shielded chamber in the tube insures maintenance of a high degree of vacuum during tube life. This reduces the possibility of gas flashes and insures maximum stability even with a hot anode. The latter effect is particularly noticeable during fluoroscopic operation where the usual drop in tube current is minimized.

BULB:

Bulbs are made of hard high transmission glass with controlled window thickness contributing to low inherent filtration and maximum X-Ray output.

COOLING AND HEATING CHART:

Proper use of the Cooling and Heating Chart and Short Time Rating Charts permits maximum service to be obtained without exceeding tube ratings.

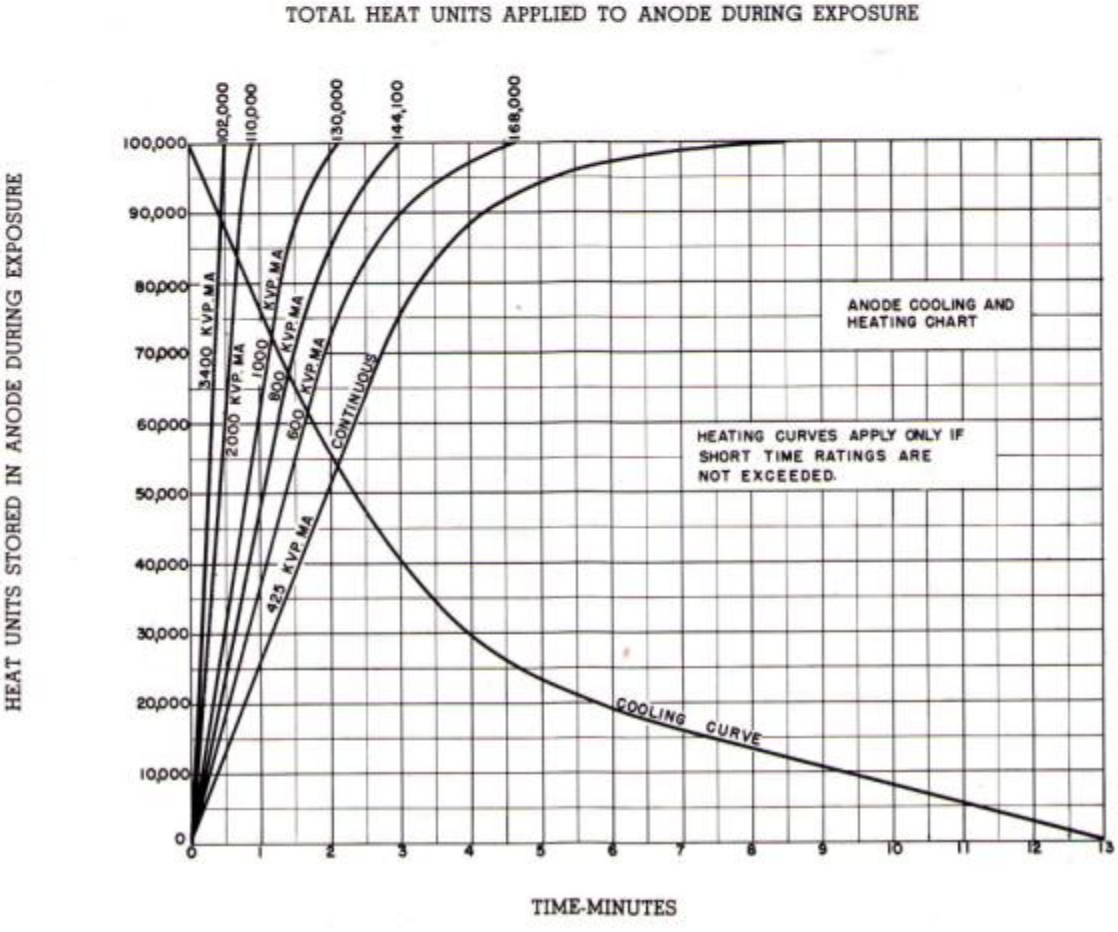
The cooling curve indicates the number of heat units (kvp x ma x sec) which are dissipated by the anode to the tube head as a function of cooling time. In order to insure continued stable operation it is necessary to limit the number of heat units in the anode to its capacity or 100,000 H.U. For this reason the number of H.U. applied to the tube must be totaled and when the heat capacity of the tube is reached a definite interval of cooling-time dependent upon the H.U. in the next exposure must be observed.

Assume a series of exposures totaling 100,000 H.U. have been applied and the next exposure is 20,000 H.U. The cooling interval before applying that exposure would be .8 minutes as read on the chart. Similarly if 60,000 H.U. have been applied and the next exposure totals 60,000 H.U., a cooling interval of 1.25 minutes is required for the anode to cool from 60,000 H.U. to 40,000 H.U. in order to permit the additional 60,000 H.U. exposure to be made without exceeding the heat capacity of the tube.

The group of heating curves labeled with heat input rates (kvp.ma) provide a means of taking into consideration the heat dissipation which occurs during exposures averaging 40ma or less. Thus if a continuous load averaging 600 kvp.ma (which is equivalent to 36,000 H.U./min) is applied, the heat curve indicates that this may be continued for a total of 4.6 minutes. The cooling curve will then determine the cooling interval required before further exposures can be made.

The 425 kvp.ma curve shows the continuous rating.

These ratings are predicated on the ability of the head to dissipate these loadings at an oil temperature of 200°F or less.

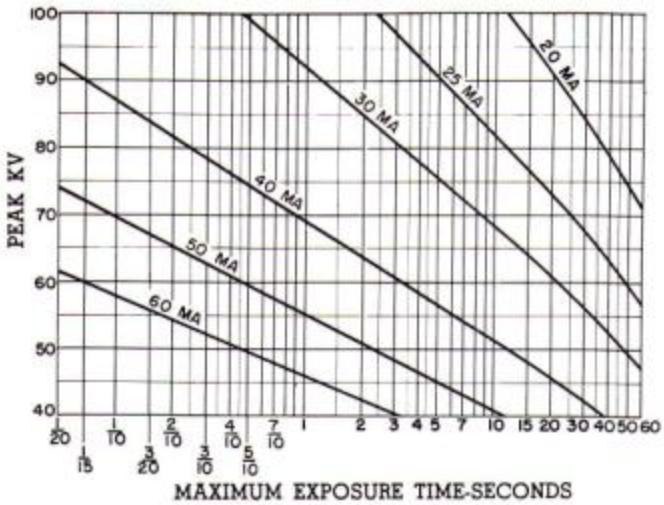


WESTINGHOUSE X-RAY TUBES

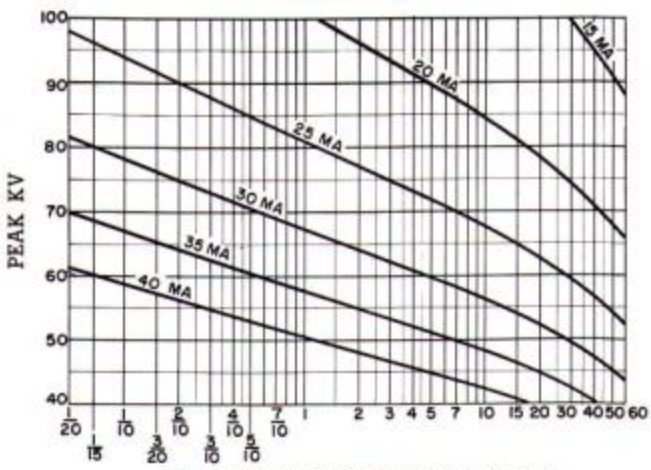
OIL INSULATED 100 KV RADIOGRAPHIC X-RAY TUBES
SHORT TIME RATINGS

1.5 mm² PROJECTED FOCAL SPOT SIZE

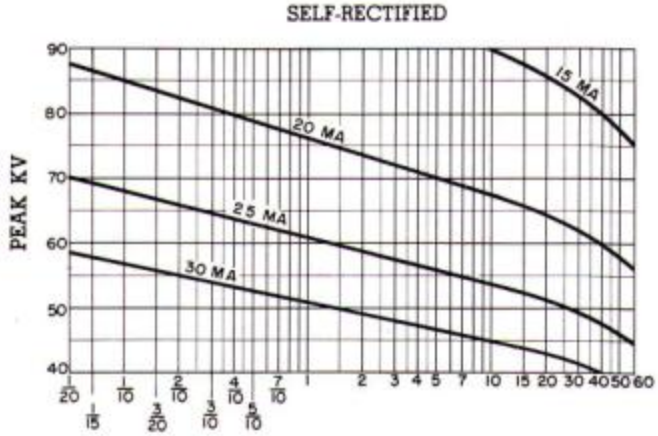
FULL WAVE



HALF WAVE

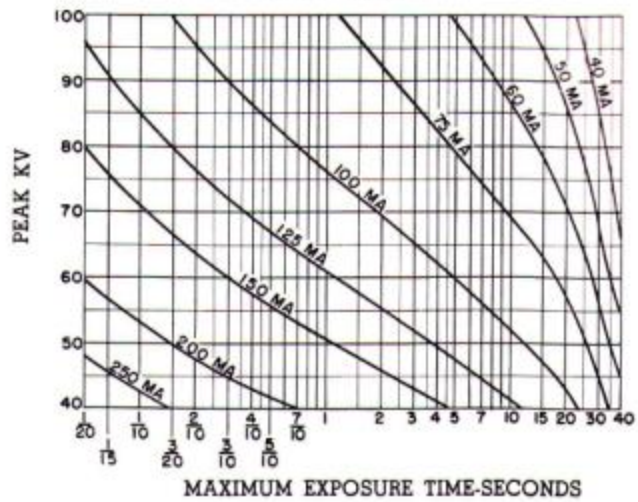


SELF-RECTIFIED

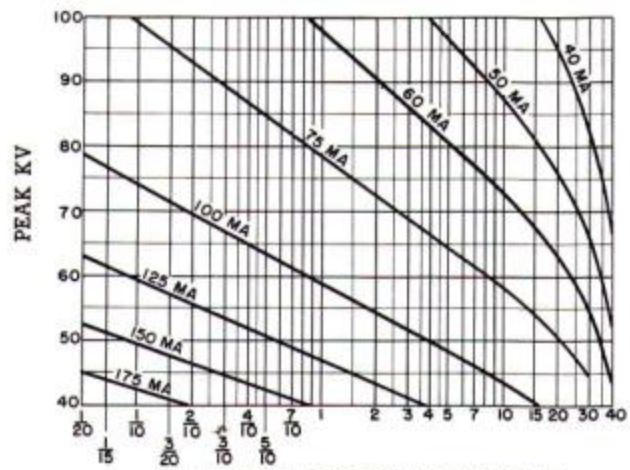


3.0 mm² PROJECTED FOCAL SPOT SIZE

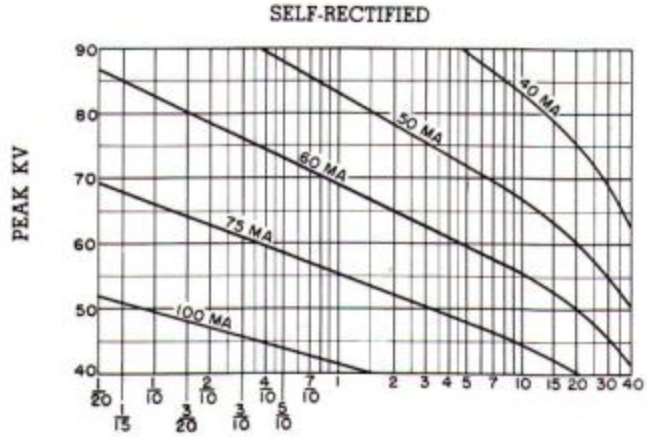
FULL WAVE



HALF WAVE



SELF-RECTIFIED



WESTINGHOUSE ELECTRIC CORPORATION
Electronic Tube Sales Department
BLOOMFIELD, NEW JERSEY

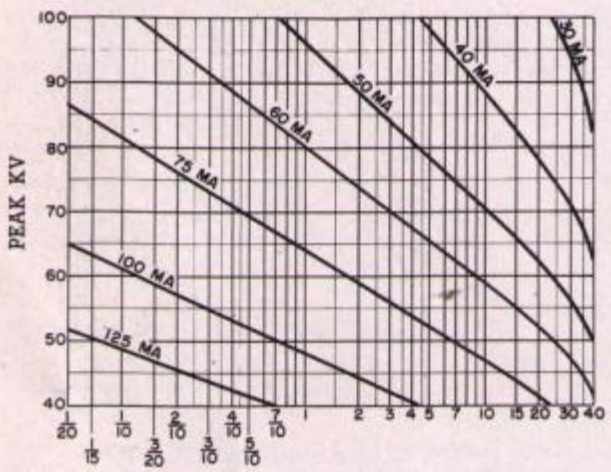
WESTINGHOUSE X-RAY TUBES

OIL INSULATED 100 KV RADIOGRAPHIC X-RAY TUBES

SHORT TIME RATINGS

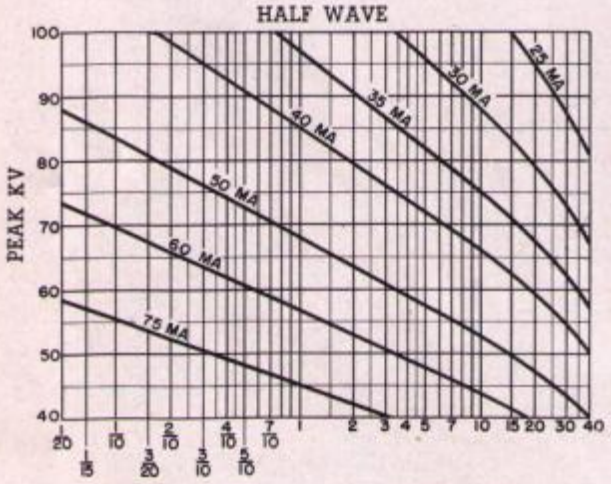
2.1 mm² PROJECTED FOCAL SPOT SIZE

FULL WAVE



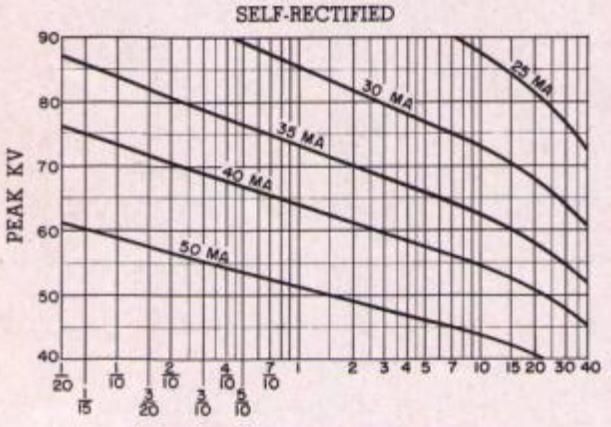
MAXIMUM EXPOSURE TIME-SECONDS

HALF WAVE



MAXIMUM EXPOSURE TIME-SECONDS

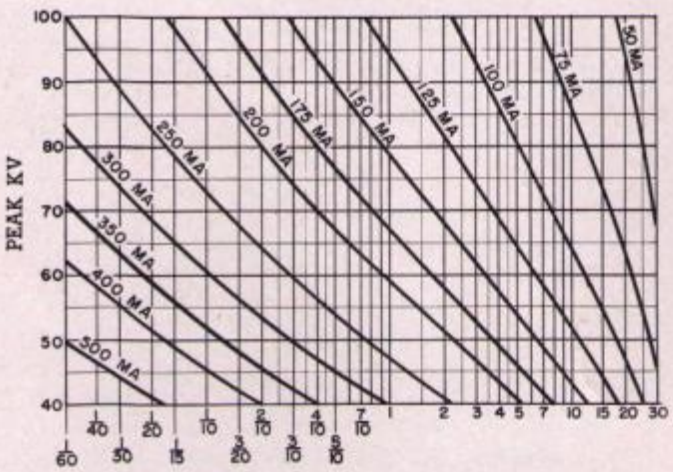
SELF-RECTIFIED



MAXIMUM EXPOSURE TIME-SECONDS

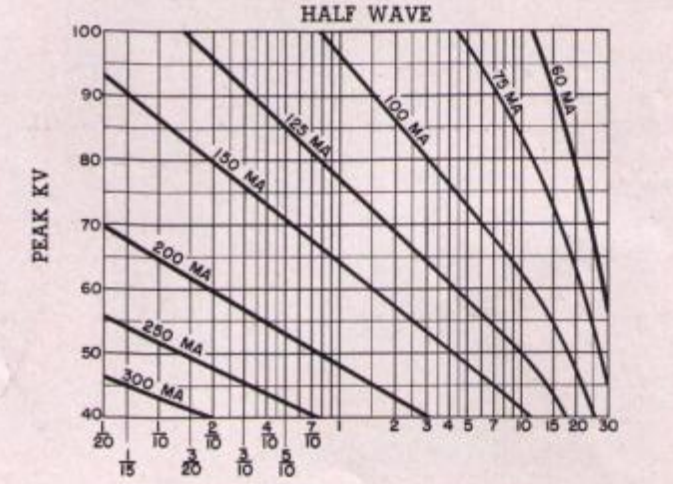
4.2 mm² PROJECTED FOCAL SPOT SIZE

FULL WAVE



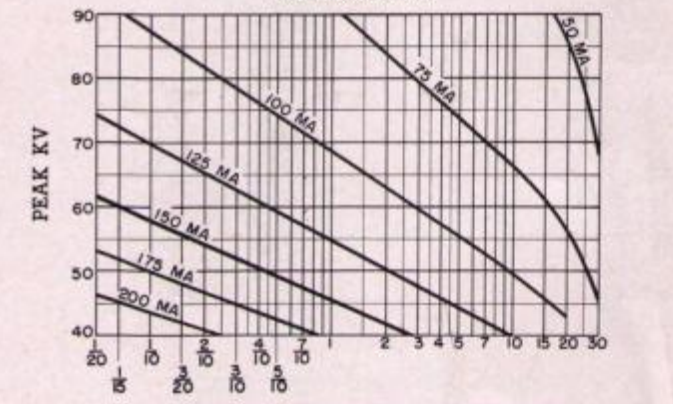
MAXIMUM EXPOSURE TIME-SECONDS

HALF WAVE



MAXIMUM EXPOSURE TIME-SECONDS

SELF-RECTIFIED



MAXIMUM EXPOSURE TIME-SECONDS

PRIL 1, 1947
RINTED IN U. S. A.
XR-11

WESTINGHOUSE ELECTRIC CORPORATION
Electronic Tube Sales Department
BLOOMFIELD, NEW JERSEY