

## INFORMATION BULLETIN

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### WESTINGHOUSE RECTIFIER TUBES

The most practical and economical means of supplying direct current in power of varying amounts is through the medium of electronic tube rectifiers operating from alternating current supply. This is particularly true for direct current power requirements of relatively high voltage and low current; however, the adoption of rectifiers is being rapidly extended into the higher current range at commercial voltages.

To prove economical, rectifier tubes for industrial applications must possess more than the mere ability to convert alternating current into direct current. In addition to being able to provide large amounts of power at high potentials many installations now require both large and small amounts of current at the usual commercial voltages. Westinghouse has contributed to this trend by the development of a line of rectifier tubes designed to eliminate short life failures and to keep the operating expenses to a minimum by the use of constructional features and materials which insure an inherently long life.

#### U S E S

For the proper functioning of Oscilloscopes, X Ray and Lenard Ray Tubes, etc., a reliable source of direct current, at a high potential, is one of the primary req-

uisites, and only through the development of high voltage rectifiers have these valuable devices found practical application.

Smoke and dust precipitation and other extremely high voltage services demand



TYPE WL-872A PHATRON

special rectifier tubes, able to deliver direct current power at potentials of 50,000 volts and higher. Such equipment has been extensively used in recovering important by-products in the flue gases of smelters, which would otherwise be carried away, resulting not only in contamination of the air but also in a direct loss of the valuable by-products. Similar equipment is also used for cleaning blast furnace gases in steel mills of abrasive particles which previously caused excessive wear in the prime movers for which flue gas is used as fuel.

For these specialized services, Westinghouse has developed a complete line of high voltage vacuum rectifiers or kenotrons, possessing such distinctive features as rugged mechanical and electrical design, and long life. These features are a decided advantage when selecting tubes for applications where freedom from interruption of service is of paramount importance.

For industrial applications of rectifier tubes where the service demands higher current, Westinghouse has developed an extensive line of gas filled rectifiers or phanotrons. The application of these tubes range from supplying power for the operation of other electronic tubes to supplying power for the operation of heavy duty electric motors and other services where the load requirements are most severe.

A third type of rectifier is the gas-filled Westinghouse Rectigon which is perhaps the most economical device for supplying direct current for the charging of storage batteries and for supplying moderate amounts of current at rather low voltages. These tubes are made in various types and sizes, the smallest, designed to accommodate the home or garage type of battery charging equipment and the larger ones, for use in battery charging equipment

in the regular commercial service stations. Still larger Rectigons are used to provide power to operate projection arcs in motion picture theatres. These Rectigon tubes are available at all Westinghouse dealers throughout the country.

The rigid requirements of spot and seam welding services are perhaps the most severe of any heavy duty electronic rectifier applications. To secure perfectly uniform welds, both the magnitude and the duration of the current must be accurately controlled. For such needs the Ignitron was developed by Westinghouse engineers and has resulted in the modernization of the mercury arc rectifier by the addition of a new control electrode in the form of an igniter from which the tube derives its name. The application of voltage between the igniter and the mercury pool cathode produces instantaneous ionization which permits a current flow limited only by the circuit characteristics. In addition it is possible to delay ignition of the arc until any predetermined time on the voltage cycle.

The rectifier uses of this tube are at present rather limited but from the development being conducted there is every indication that this tube will become an indispensable device where high currents at commercial voltages are desired.

#### D E S C R I P T I O N

The electronic rectifier performs an important function in providing a device devoid of all moving parts, by which alternating current can be changed to unidirectional current. This is brought about by its ability to pass current readily in one direction and to prevent effectively a current flow in the opposite direction.

Westinghouse rectifiers are divided into three groups: phanotrons, rectigons and kenotrons. The phanotrons comprise hot

cathode gas discharge tubes and generally are used where high currents are desired. Rectigons are low-voltage gas-discharge tubes used primarily in battery charging equipment and kenotrons are hot cathode high vacuum tubes employed in high voltage service.

All Westinghouse rectifier tubes are of the single phase type and the majority of them are designed for half wave rectification. Full wave rectification can be obtained directly from such tubes as the R0-586, R0-587, KI-664, KI-666, and the

WL-670, due to the fact that two anodes are incorporated in the bulb structure. However, two or more of the half wave types may be used in the usual multi-tube rectifier circuits to obtain full wave rectification.

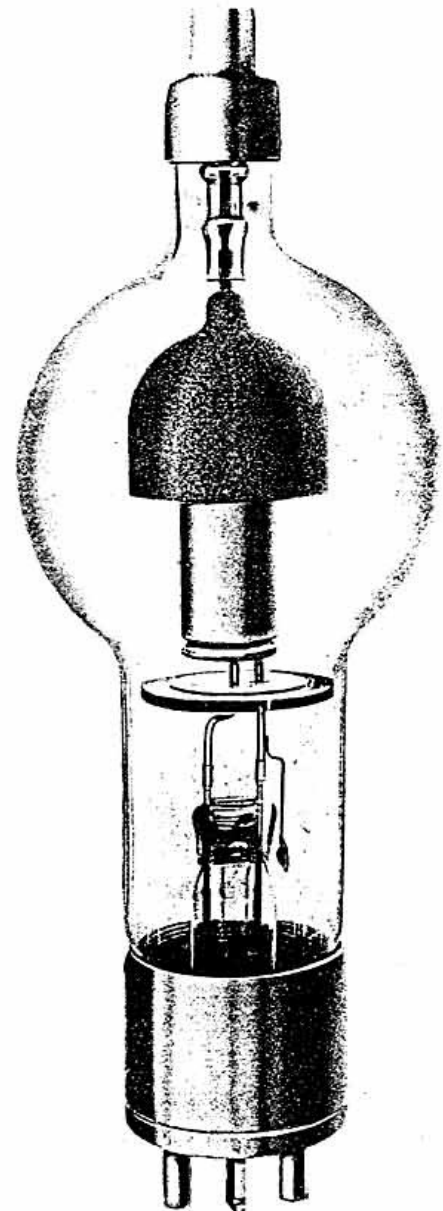
The most important and critical factors to observe in selecting rectifier tubes, from the accompanying table, for any particular application, are the crest inverse potential and the crest plate current. The former factor represents the highest instantaneous voltage that a tube

will stand, without damage, in the direction opposite to that in which it is designed to pass current and the crest plate current represents the highest instantaneous value of current that the cathode can supply without damage to the tube.

In selecting a tube it is important to realize that the application of the given limits depends upon the particular operating conditions. It would be advisable to discuss the matter of tube selection with the manufacturer to determine the best possible choice of tube conditions.



TYPE WL-612  
HIGH VOLTAGE KENOTRON



TYPE WL-869A  
HEAVY DUTY PHANOTRON

WESTINGHOUSE RECTIFIER TUBES

<u>Classification</u>	<u>Type Number</u>	<u>Rectification Wave</u>	<u>ANODE RATINGS</u>			<u>CATHODE RATINGS</u>	
			<u>Average Current Amperes</u>	<u>Crest Current Amperes</u>	<u>Crest Inverse Volts</u>	<u>Volts</u>	<u>Amperes</u>
Phanotrons (Mercury or gas-filled rectifiers)	KI-626	Half	0.30	1.20	5000	2.5	6.0
	KI-664	Full	2.5	6.0	750	2.5	14.0
	KI-666	"	1.0	3.0	750	2.5	6.4
	WL-670	"	6.0	9.5	1000	2.5	24.0
	WL-866	Half	0.25	1.0	7500	2.5	5.0
	WL-866A	"	0.25	1.0	10000	2.5	5.0
	WL-869A	"	2.5	10.0	20000	5.0	18.5
	WL-871	"	0.125	0.5	5000	2.5	2.0
	WL-872	"	1.25	5.0	7500	5.0	10.0
	WL-872A	"	1.25	5.0	10000	5.0	6.75
Kenotrons (High Vacuum, rectifiers)	WC-21	Half	0.22	0.70	15000	10.0	16.75
	WL-214	"	2.40	7.50	50000	22.0	52.0
	WL-217A	"	0.19	0.60	3500	10.0	3.25
	WL-217C	"	0.19	0.60	7500	10.0	3.25
	WL-219	"	0.80	2.50	50000	22.0	24.50
	WL-427	"	0.12	0.40	150000	10.0	50.0
	WL-444	"	0.24	0.75	110000	10.0	50.0
	WL-456	"	0.06	0.20	150000	10.0	20.0
	WL-579	"	0.003	0.01	15000	2.5	7.0
	RO-581	"	0.003	0.01	6500	5.0	2.2
	RO-583	"	0.008	0.025	25000	5.0	4.5
	RO-585	"	0.002	0.005	1500	5.0	1.1
	RO-586	Full	0.050	0.085	1200	2.5	1.5
	RO-587	"	0.290	0.450	1500	2.5	5.0
	WL-608	Half	0.06	0.20	60000	10.0	10.0
	WL-612	"	0.24	0.75	150000	10.0	50.0
	WL-613	"	0.06	0.20	140000	10.0	10.0
	WL-660	"	0.03	0.10	230000	10.0	10.0
	WL-856	"	0.27	0.85	50000	11.0	16.75

	<u>Style No.</u>	<u>Rectification Wave</u>	<u>ANODE RATINGS</u>				<u>CATHODE RATINGS</u>	
			<u>Average Current Amperes</u>	<u>Crest Current Amperes</u>	<u>Maximum D.C. Volts</u>	<u>Crest Inverse Volts</u>	<u>Volts</u>	<u>Amperes</u>
Rectigons (Low Voltage Gas - Filled rectifiers)	289415	Half	2.0	6	75.0	275	2.0	12.0
	859483	"	5.0	16	7.5	30	2.0	12.0
	289414	"	6.0	19	60.0	300	2.2	18.0
	289416	"	6.0	19	90.0	375	2.2	18.0
	766776	"	15.0	47	60.0	225	2.5	27.0
	966626	"	2.0	6	60.0	200	2.0	12.0

For prices and further information write to


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