Osram

PHOTOCELLS

CWS24 PHOTOCELL, SECONDARY EMISSION TYPE

DESCRIPTION

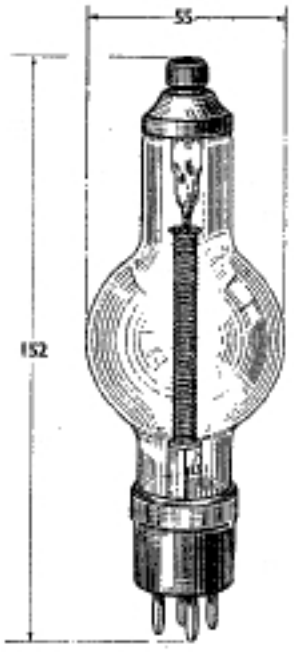
The demand for photocells of high sensitivity with stable characteristics has led to the development of the Osram CWS24 Secondary Emission type cell.

Secondary emission cells have sensitivities comparable with or even greater than the gasfilled type of cell hitherto available, and they have none of the disadvantages that are associated with the use of gas magnification. In fact they combine the good points of both the vacuum and gasfilled cells with the disadvantages of neither.

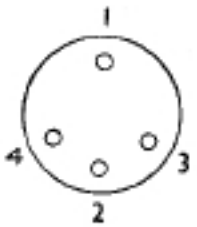
In addition to high sensitivity the absence of gasfilling ensures low noise level and a good frequency characteristic to interrupted light. Consequently secondary emission cells can be used in applications demanding a frequency response up to several megacycles per second. They can also be used for acoustic reproduction from film as well as for innumerable industrial applications.

The glass envelope housing the electrode assembly is evacuated and the primary emission from the cathode impinges on another and secondary cathode which is termed a target from which secondary electrons are ejected by the impacts of the primary electrons. Each primary electron sets free several secondaries so that a magnification of the primary current is secured. The secondary emission finally reaches a collector which is adjacent to the target and which performs the same function as the anode in the ordinary photocell.

DIMENSIONS



BASE



View looking on underside of base.

4-PIN

Pin 1:	Target
2:	Cathode
3:	Not connected
4:	Not connected
Top screw cap:	Collector

Dimensions are in mm. and are the maximum except where otherwise stated.

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OPERATING CONDITIONS (see Fig. 1)

The collector is maintained at a positive potential with respect to the primary cathode. The secondary cathode or target is also at a positive potential with respect to the primary cathode but at a negative potential with respect to the collector.

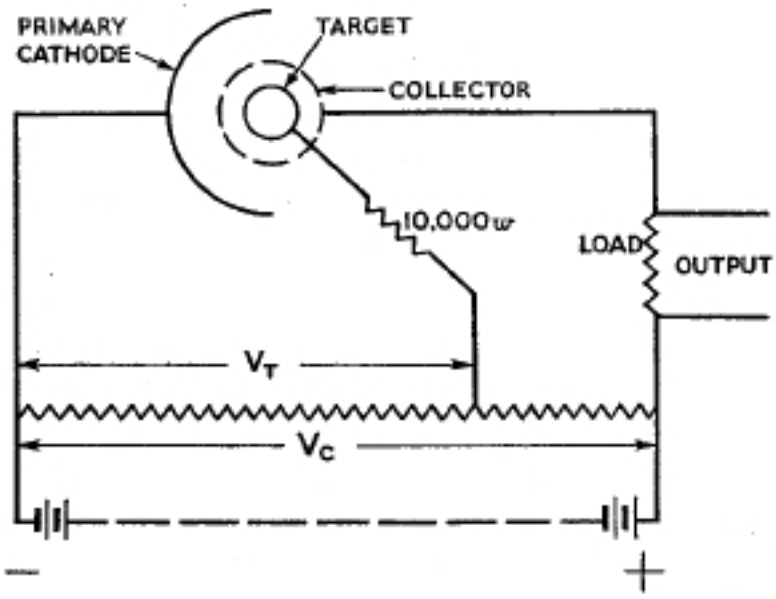

Fig. 1

It is recommended that the potential difference between the primary cathode and target be 75 per cent. of that between primary cathode and collector. The total voltage between primary cathode and collector (anode) may be anything up to 800 volts, but under most conditions a total voltage of half this value will be found to give sufficient output.

A safety resistance of 10,000 ohms should be inserted between the source of potential and the target, the load resistance whose value will be determined by the purpose for which the cell is used, should be connected between the source of potential and the collector.

CONSTRUCTION OF THE CELL

The primary cathode is formed on the silver surface which is deposited on one half of the internal surface of the spherical bulb.

The target is formed on a silver tube which is supported in the middle of the bulb and the collector or anode is also supported at the centre of the bulb and consists of a molybdenum spiral coaxial with and surrounding the target.

Both primary cathode and target are of the caesium-oxygen-silver type (Ag—Cs_2O, Ag—Cs). The collector and target have separate seals through the bulb in order to reduce the capacitance of the collector to a minimum.

ELECTRODE CONNECTIONS

The primary cathode is connected to the grid pin of the valve base, the target to the anode pin and the collector to a screw cap at the top of the bulb (see base connections).

Fig. 2 shows the variation in sensitivity with overall voltage when the potential of the target is 75 per cent. of the collector voltage.

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PERFORMANCE

The sensitivities are given in μA/lumen, the source of illumination being a gasfilled tungsten lamp running at 2,848°K, and the degree of constancy of the cell is that which is usually associated with the vacuum type. Tests carried out with frequencies up to 1 Mc/s have shown that the response is consistent with that which would be expected from a vacuum type cell.

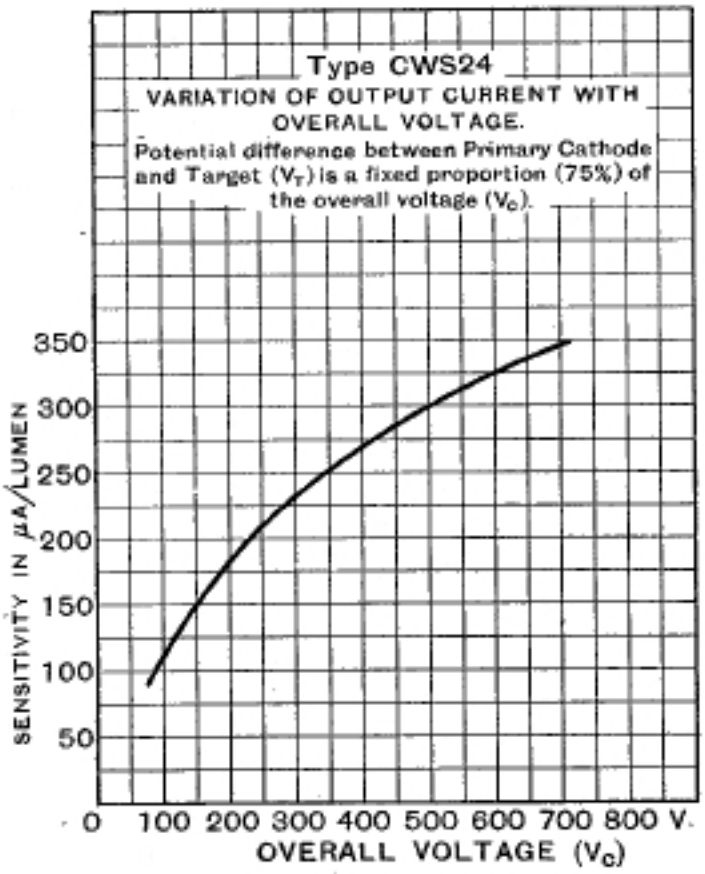

Fig. 2

Average sensitivity curve of an Osram CWS24 Secondary emission cell.

The background noise is extremely low compared with that present in a gas-filled cell under fairly high gas magnification. Here again it is what would normally be associated with a good vacuum cell.

Minimum sensitivity when tested at an overall voltage of 300.