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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
L C 117
See LC 199

April 24, 1924

SELENIUM CELLS

1. This communication is sent in response to your inquiry concerning selenium cells.

2. Information on the design, construction and characteristics of selenium cells may be found in a book on "Selenium Cells, (How Made)", by Thomas W. Benson, (published by Spon and Chamberlain, 120 Liberty Street, New York City, N. Y.); also in a book on Selenium Cells by Samuel Wein (The Progress Publication Company, New York); and in Bureau of Standards Scientific Paper No. 319, which may be obtained from the Superintendent of Documents, Government Printing Office, Washington D. C., at a cost of ten cents per copy.

3. At this writing, selenium cells may be purchased from the following dealers: The Braun Corp., Los Angeles, Calif., The Photoelectric Bean-Grader Company, Inc., Ithaca, Michigan, John J. Griffin and Sons, Ltd., London, England; James Biddle, Philadelphia, Pa., and The Electro Importing Company, New York.

4. The element, Selenium, may be purchased from dealers in chemical supplies, e.g., Eimer and Amend, New York City, N. Y.

5. Photoelectric cells of the gasionic type, made of potassium, barium, etc., may be purchased from The Case Research Laboratory (which makes also the Thalofide cell), Auburn, New York; and from Prof. Jakob Kunz, University of Illinois, Urbana, Illinois; and from the General Research Laboratories, 326 River Street, Chicago, Illinois.

6. The electrical properties of a selenium cell depend so much upon heat treatment, that specific statements cannot be made. Its sensitivity is a function of many factors; for example, temperature, also the intensity and the color of the light.

7. In the dark, the resistance of a selenium cell increases with decrease in temperature. Records show that a selenium cell, having a dark resistance of 1,000,000 ohms at 20° C, (68° F) increased to three times that value (3,000,000 ohms) at 0° C, (32° F).

8. When exposed to light, the resistance of a good cell drops as low as 1/10 to 1/50 of its value when in the dark. But this change in resistance is a function of the spectral quality (the color) and the intensity of the light; also the temperature of the cell. At low temperatures(0° C) the intrinsic photoelectrical sensitivity of the selenium cell is far greater than at 20° C.

9. Selenium cells usually have a dark resistance of 100,000 to 500,000 ohms. When exposed to full daylight, the resistance may be reduced to between 3,000 to 10,000 ohms. The resistance change of the selenium cell on exposure to light, and its recovery after exposure is not instantaneous, especially when exposed to light of long wavelengths.

10. In Scientific Papers No. 319, p. 527, reference are cited showing that the spectral light sensitivity curve of a selenium cell depends upon heat treatment. A cell that has been annealed at 200° C, has its maximum sensitivity in the red part of the spectrum, while a cell which has been annealed at 150° C, has its maximum sensitivity in the blue-green part of the spectrum.

11. Since the magnitude and the position of the spectral maximum of sensitivity of a selenium cell depends so largely upon heat treatment (as well as upon temperature and perhaps humidity) we do not regard it a suitable device for standardization.