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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
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Letter
Circular
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EMISSIVITY OF PAINTS FOR RADIATORS, CANOPIES, ETC.

This communication is sent in response to your inquiry concerning the use of paints on house radiators, tents, awnings, etc.

A short account of this Bureau's researches on the emissivity of paints, which pertains to the reduction of heat radiation from the underside of roofs, automobile tops, awnings, etc., and only incidentally as applied to radiators, which are convectors of heat, is given in the September issue of Architecture and Building, published by the William T. Comstock Company, 23 Warren St., New York.

This paper gives sources of information regarding the dissipation of heat by house radiators, etc., which matter is discussed also in Professional Bulletin No. 4, issued by the Sherwin Williams Company, Cleveland, Ohio, and in a treatise entitled "Aluminum Paint" issued by the Aluminum Company of America, Pittsburgh, Pa.

The results of this Bureau's investigation will be issued as a Technologic Paper entitled: "Emissive Tests of Paints for Decreasing or Increasing Heat Radiation from Surfaces".

Our tests were made by coating the outer (or under) side of a sample of sheet iron, cotton duck, roofing material, etc., with aluminum or some other paint, and exposing it to the sun. The intensity of heat radiated from the under side of painted sample was then compared with that of a similar unpainted sample, used as a standard.

The results of our measurements show that a coating of aluminum paint, appliedto the underside of a plate of sheet iron, emits only 28 to 30 percent as much heat radiation as a white paint, vitreous enamel or other nonmetallic surface.

Aluminum paint applied to the outside of an automobile top or other dark "artificial leather" covering reduces the radiation from the underside by 50 percent; applied to the underside of a tent it shuts out 80 to 85 percent of the heat radiated from the underside.

For an opaque roof the best arrangement is a coat of white paint or asbestos on the outside and aluminum paint on the underside. This reduces by 50 percent the heat radiated from the underside.

The application of this information to the painting of radiators for heating houses is obvious. But the gain in heat dissipation into the room by covering the surface with a nonmetallic paint, is not 2 to 3 times that of the aluminum paint as might be inferred from the above mentioned data. This is owing to the fact that an ordinary steam radiator is cellular in structure which facilitates heating of the air by conduction and convection. The heat radiated from the sides is relatively of secondary importance.

The effect of different kinds of paints upon the heat dissipation of house radiators was studied by Allen and Rowley, Jour. Amer. Soc. Heating and Ventil. Eng., Vol. 26, p. 103, 312 and 317; 1920. See also Elect. World, Vol. 57, p. 1616; 1911.

They found that a two-column radiator, of thirteen sections, coated with aluminum paint dissipated only about 80 percent as much heat into the room as when coated with zinc oxide, green or white enamel, terra cotta, shellac varnish, etc.

From this it appears that a gain of 15 to 20 percent in heat dissipation into a room may be expected by covering the ordinary multi-segmented house radiator with a nonmetallic paint. By nonmetallic paint is meant a material which does not contain the flakes of pure metal, whether aluminum or bronze. If the radiator happens to be coated with aluminum paint, the nonmetallic coating may be painted over the aluminum paint, which is a good conductor of heat and hence does not impede thermal conduction through the walls of the radiator. This nonmetallic coating need not be black paint. The white lead and zinc oxide paints and enamels, the chrome colored pigments, the greenish colored oxides, such as chromium oxide, etc., offer a variety of tints for decorative purposes, with greater efficiency in heat dissipation.