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PAINTING OF FERROUS METALS

The principal advantage of painting iron or steel parts of a house is to afford protection against corrosion. However, the decorative effect is of increasing importance with the widening use of steel for building purposes. Bare steel surfaces, as well as tin or terne-coated metal, should be painted without delay after installation.

Galvanized surfaces should not be painted for at least six months after installation. Weathering roughens a galvanized surface, greatly improving the adherence of the paint. If, however, it is necessary to paint such surfaces before they have been allowed to weather, they may be treated with an etching solution. Several of these, as well as a number of paints for use on various metals, are described in National Bureau of Standards Letter Circular 422, "The Painting of Structural Metal (Steel, Galvanized Metal, Tin Plate and Copper)", (August 10, 1934),¹ by Percy H. Walker and E. F. Hickson.

Before being painted, a metal surface should be freed from scale, oily or greasy films or rust, and should be dry. Oil or grease is removed by a solvent such as gasoline or benzene; scale and rust by a wire scratch brush or a sand blast. Painting should be done on a clear warm day; never in wet or foggy weather. The paint may be applied by brushing or by spraying.

Paints consist of a liquid portion called the "vehicle" and a solid portion known as the "pigment". The vehicle contains a non-volatile portion consisting of drying oils such as linseed, fish, tung, etc., resins and compounds of drying metals, as well as volatile thinner, such as mineral spirits, turpentine, etc. The pigment consists of very finely divided solid matter that is essentially insoluble in the vehicle. Many paint technologists recommend that the pigment in

¹Available from the National Bureau of Standards, Washington, D. C. (Free).

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a dried paint film should be at least 28 percent by volume. Among the important pigments for paints to be used on metals are red lead, basic lead chromate, iron oxide, white lead, zinc oxide, various carbon pigments, aluminum powder, etc. Under conditions favorable to corrosion of the basis metal, such as bare spots, breaks in the coating, etc., some pigments, such as carbon black, increase corrosion of the metal if in direct contact with it. Other pigments, such as basic lead chromate, retard corrosion under similar circumstances. It is important, therefore, in priming or first coats, to avoid the use of paints containing carbon black, although this is often an excellent pigment in a finish paint coat.

The "covering" or hiding power of a paint is largely determined by the specific properties and particle size of the pigment material. In general, the finer the particle size, the greater the covering power. Other important qualities of the pigment are color-permanence and inertness to attack by the atmosphere. The deteriorating effect of sunlight on the vehicle of paints may be minimized by the use of dark pigments which tend to exclude the harmful radiation. Aluminum paint is considered very good from this standpoint because the aluminum pigment consists of particles having the form of small thin scales which, by "leafing out" in the liquid vehicle, overlap and form a layer which efficiently excludes harmful light rays. Aluminum paint is also considered relatively effective in excluding water from the metal surface to which it is applied.

In nearly every case, at least two coats should be used in painting the metal parts of a house. The first or "priming" coat on bare iron or steel should be a paint containing inhibitive pigments, and should cover the metal completely. It should be free from pores or blisters, and should adhere well to the metal surface. After the first coat has completely dried, the finishing paint should be applied in one or more coats as needed. Each coat should be allowed to dry thoroughly before the next is applied. More than two finish coats are not ordinarily required. It is important to avoid building up paint films to an excessive thickness because of the trouble which may result from scaling.

Some methods of painting metals to be buried in the soil are suggested in TIBM - 29, "Corrosion of Ferrous Metals Underground."