



INTRODUCTION TO METALS

PURPOSE

This section provides basic introductory information on properties of metals, both ferrous and non ferrous and their use as a substrate for paint coatings.

INTRODUCTION

Metals possess many unique fundamental properties that make them an ideal material for use in a diverse range of applications. Structures ranging from bridges, silos and tractors to gym lockers and lawn mowers all contain some form of metal. Properties such as high tensile strength, high fracture toughness, malleability and availability are just some of the many advantages associated with metals.

Metals are chemical elements that are known generally for their metallic lustre, strength, hardness, and ability to conduct heat and electricity. Metals are generally not used in their pure state but as mixtures of metals or metal and non metal constituents commonly referred to as alloys. Alloying allows metals to be created with a vast range of properties allowing them to be used in a great variety of applications. Metals are divided into two main categories, ferrous and non-ferrous. Ferrous metals contain iron whereas non-ferrous metals do not.

Ferrous and non-ferrous metals possess different properties; of particular importance is the rate at which they corrode in the natural environment. These properties greatly affect the type of coating system required.

FERROUS METALS

Ferrous metals contain iron as the main component. Unprotected ferrous metals are extremely susceptible to corrosion commonly referred to as rust, which can occur almost immediately under the correct conditions. Rust is a continuous process, as the rust flakes off the surface exposing fresh metal. Steel (a common alloy) is used in almost every aspect of our lives from cars, buildings and bridges to chairs, cooking utensils and paper clips. Consequently, ferrous metals with their vast use in our environment require protection to ensure corrosion does not occur. Corrosion protection can be performed by creating a barrier between the metal and the environment, or by galvanic or cathodic protection methods. Paint coatings generally are barrier coatings although zinc rich coatings protect the metal by sacrificial galvanic protection.

NON-FERROUS METALS

Non ferrous metals are metals that do not contain iron. Examples include aluminium, zinc, copper and brass. In general non ferrous metals do not corrode as quickly as ferrous metals due to the rapid formation of a thin protective oxide layer on their surface although they are still susceptible to corrosion when exposed to atmospheric conditions. Due to the presence of the surface oxides, non-ferrous metals have different requirements for surface preparation and priming than ferrous metals.

COATING METALS

Coatings in the metal industry are aimed primarily at protecting metals from aggressive atmospheric conditions that can cause corrosion. The secondary purpose of metal coating is purely for decorative purposes.

Many metals are susceptible to the corrosive effects caused primarily by moisture and oxygen in the atmosphere. Corrosion may be prevented by creating a barrier between the metal and the environment using an appropriate paint coating. The effectiveness of a coating to protect the metal is dependent on many factors including: metal type, exposure conditions, coating choice and surface preparation. In addition, it is crucial that the coating is applied using the correct method at the correct film build under the suitable ambient conditions.



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