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Название публикации: «CORROSIVE EROSION OF METALS AND FACTORS AFFECTING CORROSIVE EROSION»

Annotation. Rusty decay types Corrosion is this detail outside environment under the influence chemical two electromechanical is corrosion (rusting and decaying leave , crumble particles separated exit). Corrosion people to the farm big damage the work has been developed

Key words. Textile, chemical corrosion, Electrochemical corrosion,
Textile industry and light in industry often paint decoration cars , skin processing to give jungle on the skin processing to give , like enterprises cars to corrosion occurs . Because in these fields, machines work in an environment of strong chemical substances and in wet conditions. (in fields such as lub fiber harvesting, cotton thread weaving, weaving, weaving).

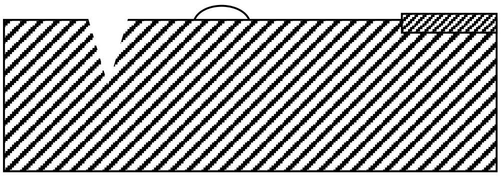
CHEMICAL CORROSION - occurs when a metal is exposed to an electrically non-conductive environment. In this case, an oxidation-reduction reaction occurs on the surface, in which the metal's electrons are transferred to an acid atom. Examples of this include the reaction of a metal with oxygen, hydrogen sulfide, sulfur dioxide, and halogens. Chemical corrosion can also occur in electrically non-conductive liquids.

Electrochemical corrosion occurs when a metal interacts with an electrically conductive environment (such as acids, salts, alkalis, moist air, gases).

Depending on the humidity level, corrosion can be divided into the following: Normal corrosion occurs when the relative humidity of the air is around 100%, and a thin layer of moisture on the surface of the part, which can be seen with the naked eye, cannot be seen with the naked eye. The relative humidity of the air is less than 100%.

Wet corrosion often occurs in parts of the textile machinery industry. For example, in spinning and weaving workshops, the air is artificially humidified. In this case, moisture accumulates on the surface of the machine parts due to capillary condensation. The centers of capillary condensation can be cracks (seams) (see figure

1), gaps between the part and dust particles adhering to its surface (2), and between rusted particles (3).

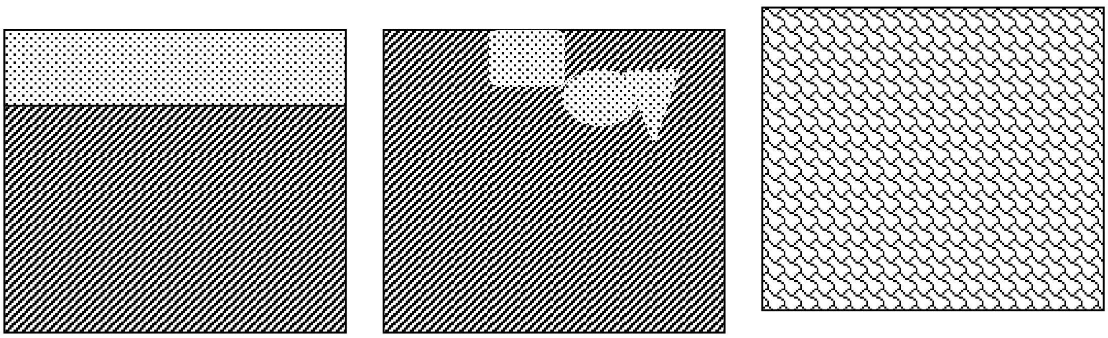


Moisture accumulates better on concave surfaces than on convex surfaces. If the air contains SO2, C12, H2O3, CO2, H2S gases, corrosion accelerates even more, because such gases increase the electrical conductivity of moisture accumulated on the surface. Rusting of the metal begins at the surface and gradually progresses to the depths, the surface changes color, becomes covered with rust, loses its shine, and most importantly, the mechanical properties of the metal, its resistance to corrosion, decrease, and leads to a serious breakdown (accident).

There are three types of corrosion.

Planar rusting, local rusting and intercrystalline rusting begin. The strength of the detail begins to decrease accordingly. The speed of this process is equal to the metal mass lost per unit of time.

In local corrosion, erosion of the metal surface occurs in some areas. This type of rusting is more dangerous because some of the rusted areas have built-up stresses and this can cause the part to break.



Uneven rusting, corrosion of the metal surface in various depressions is observed in some places. Compared to rusting, uneven rusting can erode the detail faster. Types of uneven rust are as follows:

local corrosion (constructed above)

pitting corrosion

layer by layer corrosion

selective corrosion

intercrystalline corrosion

transcrystalline corrosion

Pitting corrosion occurs around a small area and its depth is much greater than its width.

Characteristics of pitting corrosion.

1) Points per unit surface

2) Corrosion depths

3) Ratio of corroded surface to uncorroded surface.

Double -layer corrosion is found in parts made of two-layer rolled materials. In this case, the eangs begin to move from the main issue layer by layer. But such corrosion is rare.

Selective corrosion occurs when a metal reacts with a certain chemical active substance and rusts. It can occur during the cleaning of brass materials from spirits. In this case, cracks appear on the surface of the metal. Ipsilon corrosion - another name for electrolytic corrosion - occurs in the cavities of large rivers under thin transparent coatings with the appearance of thin long metal fibers. It occurs in conditions where the humidity is 65-93%. It reduces the appearance of the part, but does not affect the corrosion of the part.

Intergranular corrosion occurs and develops between the metal crystal particles and may not be visible from the outside.

This type of corrosion can significantly weaken the strength of the part and can lead to failure .

Intercrystalline corrosion can occur under the influence of electrochemical processes.

In transcrystalline corrosion, cracks appear perpendicular to the crystals and, as a result, have a significant depth, which reduces the mechanical properties of the parts and leads to their fracture. The internal stresses formed in the part can cause the deformation of the metal acids to shift or twist. As a result, the metal can accelerate corrosion or accumulate at one point. Local corrosion can gradually increase the intercrystalline acid. In fatigue corrosion, the material is subjected to variable cyclic loading and begins to corrode even at a relatively low stress. A large number of cracks (microcracks) appear on the surface. This causes a build-up of stresses and leads to intercrystalline corrosion. Providing a protective layer to the surface is a way to reduce its roughness and use corrosion-resistant metals

Corrosion can be reduced with.

Friction corrosion occurs in pairs with a large coefficient of friction, the pairs are in a state of strong friction against each other and are in a vibrating motion. Hard metal particles are pushed out of the surface and oxidize in air, turning into even harder particles and starting to push out particles from the main mass. As a result, corrosion accelerates. Atmospheric corrosion is caused by the activity of harmful gases (sulfur dioxide, hydrogen chloride, hydrogen sulfide) in the air.

This is electrochemical corrosion. A thin layer of water formed on the surfaces of the electrolyte causes many devices to undergo atmospheric corrosion.

The corrosion resistance of metal is measured on a 10-point scale b and is determined by the thickness of the rust layer in one year. There are the following levels of endurance:

1. Absolute stability - less than 0.001 mm/year 1 point
2. Highly stable 0.001 to 0.005 2 points 0.005 to 0.01 3 points
3. Stable from 0.01 to 0.05 4 points 0.05 to 0.7 5 points
4. Low stability 0.1 to 0.5 6 points 0.5 to 1.0 7 points
5. Very little stable 1 to 5.0 8 points 5 to 10 9 points
6. Unstable above 10.

The main causes of corrosion are as follows:

metal structure and composition and

the condition of the metal surface of the environment

, internal stresses, the method of preparation, the nature of the environment,
the effect of temperature

Metal composition and structure:

All metals corrode, some more than others.

Steel. Different chemical elements included in its composition have different effects on corrosion. For example:

Copper over 0.15% slows down

Nickel 3% ----------- # -------------

Chromium 3 % ----------- # -------------

Manganese has no effect if it is less than 0.7%, but accelerates if it is more than 0.7%.

Phosphorus is not affected if it is up to 0.12%

Silicon has no effect if less

Sulfur has no effect if less Sulfur accelerates if

0.15% and no copper

Carbon accelerates if more than 0.15%

Most grades of structural carbon steel are in Group 4 or 5 in terms of corrosion resistance, meaning they are not very resistant to corrosion . Therefore, chromium, nickel, and copper are added to them.

Stainless steel contains 12-14% chromium. Chromium forms a thin oxide layer on the surface of the metal and prevents the metal from rusting. Stainless steel grades x12 2x 13 3x13 have a group corrosion resistance. If they are subjected to heat treatment, their corrosion resistance increases. X18H9T chromium nickel titanium steel Cast iron Ordinary gray cast iron is not resistant to corrosion , due to the heterogeneity of its composition (for example, compared to steel)

The pearlite-structured cast iron is not resistant to corrosion, because its composition is not uniform. Modified cast iron is highly resistant to corrosion in a strong solvent environment. Its resistance is very high in a 60% sulfuric acid and molten caustic sodium environment. An example of such cast iron is cast iron modified with silico-palmium. Its composition is C-2.9 ... 3.2, Si -0.8%, Cr -0.4 ... 0.8%, Ni -0.6 ... 0.8%

In environments with high humidity, titanium-like cast iron (TMC) with a pearlite structure is resistant to corrosion. It is resistant to corrosion due to the presence of up to 1% copper in its composition. To make cast iron more resistant, chromium and nickel must be added to its composition. Cast iron is usually resistant to corrosion because its surface has a thin protective layer of oxidation. Highly alloyed iron-carbon alloys belonging to the cast iron group are also quite chemically stable. Examples of this are ferrosilicon (up to Si-14.5%) silicon-molybdenum (Si-13.5...16 %); Mo - 4.0...3.25%); and high-chromium (Cr-25...36%) cast irons. They are widely used in finishing and painting shops. Lead is widely used in finishing and painting equipment. Lead is highly chemically stable in solutions of sulfuric acid and its salts . A thin layer of P6SO4, firmly bonded to the metal, forms on its surface and protects it from rust. However, if the concentration of sulfuric acid exceeds 80% (85-90C in the hot state) and 92% in the cold state, the thin layer begins to corrode and corrosion resistance is lost. The presence of nitric acid residues in sulfuric acid, the formation of aluminum, zinc (spirit), tin in lead reduces its corrosion resistance. The deposition of impurities in vessels and pipelines also causes local corrosion of lead. Lead can rust strongly in places where it is connected by welding. Lead is very resistant in the environment of sodium hypochlorite and sour salt aniline. Lead baths are used cold in a solution of up to 10% hydrochloric acid, but not in other cases. Lead also dissolves quickly in alkalis. Example: It corrodes rapidly in an acidic oxide environment. It dissolves very quickly in nitric acid. Sulfuric acid (50-60) also corrodes rapidly at temperatures above 60 C. Weak acids do not affect the work in normal conditions. It does not dissolve in organic and salt-forming acids, but it corrodes rapidly if they contain oxygen.

Aluminum also corrodes quickly and reacts quickly with other substances, but it is highly chemically stable in nitric and acetic acids. Aluminum forms a protective layer on its surface , which is strongly bonded to the metal, so it does not rust. Many substances added to aluminum (iron, lead, copper) reduce its durability. It corrodes quickly from welded and treated areas, internal stresses arising during mechanical processing accelerate rusting.

Colored alloys Bronze brass Their sugar is chemically stable. alloys that form a solid solution are homogenous; in tin bronze, when tin is 13.8%, a solid solution is formed. If tin increases, the chemical stability will decrease. If zinc is 2.3%, it will not affect much.

In aluminum bronze, when aluminum is up to 9.8%, a solid mixture is formed, if a small amount of nickel and iron is added, the mixture does not maintain a homogeneous state. In silicon bronze, silicon can be 3... 3.5%, and one percent of manganese is added to it. In brass, zinc is stored in a solid state when it is up to 38.5%.

Compared to copper and brass, bronze is acid resistant (durable). Silicon bronze is the most acid resistant of all alloys.

Metalopera porous materials Iron-graded porous materials are resistant to rusting under any conditions, even if they are soaked in oil. Temperatures above 300 C , such details exposed to water vapor are especially prone to rusting.

It is resistant. For example, in such conditions, bronze bearings work for a few days, while iron grade hollow bearings work for up to 6 months. They corrode quickly if used in water.

Non-metallic materials can actually be chemically corroded due to their non-electrical conductivity, but layered plastics belonging to the tektolite group are chemically stable in hydrochloric acid, medium concentrations of sulfuric acid, in salt solutions, in solutions of organic compounds, and in a gas environment at temperatures up to 100 C. Azotshavel, active in sulfuric and hydrochloric acids with a high concentration, sulfur gas is not stable in chlorine solutions.

Wood impregnated with phenol-formaldehyde resin is chemically stable in all aggressive environments. It is not chemically stable in solvents, alkalis and some organic solvents. Styrene, nitrile rubber and acylimitrile copolymers are chemically active, along with their resistance to variable forces.

Siccatives are substances that accelerate the development of vegetable oils and oil varnishes. Lead, manganese salts and oxides are used as siccatives. Pigments are salts and oxides of metals.