

Corrosion Glossary

failure

A general term used to imply that a part in service (1) has become completely inoperable, (2) is still operable but is incapable of satisfactorily performing its intended function, or (3) has deteriorated seriously, to the point that it has become unreliable or unsafe for continued use.

Faraday's law

(1) The amount of any substance dissolved or deposited in electrolysis is proportional to the total electric charge passed. (2) The amounts of different substances dissolved or deposited by the passage of the same electric charge are proportional to their equivalent weights.

fatigue

The phenomenon leading to fracture under repeated or fluctuating stresses having a maximum value less than the tensile strength of the material. Fatigue fractures are progressive and grow under the action of the fluctuating stress.

fatigue crack growth rate

The rate of crack extension caused by constant-amplitude fatigue loading, expressed in terms of crack extension per cycle of load application.

fatigue life

The number of cycles of stress that can be sustained prior to failure under a stated test condition.

fatigue limit

The maximum stress that presumably leads to fatigue fracture in a specified number of stress cycles. If the stress is not completely reversed, the value of the mean stress, the minimum stress, or the stress ratio should also be stated. Compare with *endurance limit*.

fatigue strength

The maximum stress that can be sustained for a specified number of cycles without failure, the stress being completely reversed within each cycle unless otherwise stated.

Ferritic

Pertaining to the body-centered cubic crystal structure (BCC) of many ferrous (iron-base) metals.

ferrite

(1) A solid solution of one or more elements in body-centered cubic iron. Unless otherwise designated (for instance, as chromium ferrite), the solute is generally assumed to be carbon. On some equilibrium diagrams, there are two ferrite

Fogged Metal

A metal whose luster has been reduced because of a surface film, usually a corrosion product layer.

foreign structure

Any metallic structure that is not intended as part of a *cathodic protection* system of interest.

fouling

An accumulation of deposits. This term includes accumulation and growth of marine organisms on a submerged metal surface and also includes the accumulation of deposits (usually inorganic) on heat exchanger tubing.

fouling organism

Any aquatic organism with a sessile adult stage that attaches to and fouls underwater structures of ships.

fractography

Descriptive treatment of fracture, especially in metals, with specific reference to photographs of the fracture surface. Macrofractography involves photographs at low magnification (< 25x); microfractography, photographs at high magnification (>25x)

fracture mechanics

A quantitative analysis for evaluating structural behavior in terms of applied stress, crack length, and specimen or machine component geometry. See also *linear elastic fracture mechanics*.

fracture toughness

A generic term for measures of resistance to extension of a crack. The term is sometimes restricted to results of *fracture mechanics* tests, which are directly applicable in fracture control. However, the term commonly includes results from simple tests of notched or precracked specimens not based on fracture mechanics analysis. Results from test of the latter type are often useful for fracture control, based on either service experience or empirical correlations with fracture mechanics tests. See also *stress-intensity factor*.

free carbon

The part of the *total carbon* in steel or cast iron that is present in elemental form as graphite or temper carbon. Contrast with *combined carbon*.

free corrosion potential

Corrosion potential in the absence of net electrical current flowing to or from the metal surface.

free ferrite

Ferrite that is formed directly from the decomposition of hypoeutectoid

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| | regions separated by an austenite area. The lower area is alpha ferrite; the upper, delta ferrite. If there is no designation, alpha ferrite is assumed. (2) In the held of magnetics, substances having the general formula: $M^{2+}O \cdot M_2^{3+}O_3$, the trivalent metal often being iron. | austenite during cooling, without the simultaneous formation of cementite. Also called proeutectoid ferrite. |
| filiform corrosion | Corrosion that occurs under some coatings in the form of randomly distributed threadlike filaments. | |
| film | A thin, not necessarily visible, layer of material. | |
| fish eyes | Areas on a steel fracture surface having a characteristic white crystalline appearance. | |
| flakes | Short, discontinuous internal fissures in wrought metals attributed to stresses produced by localized transformation and decreased solubility of hydrogen during cooling after hot working. In a fracture surface, flakes appear as bright silvery areas; on an etched surface, they appear as short, discontinuous cracks. Also called shatter cracks or snow flakes. | |
| flame spraying | <i>Thermal spraying</i> in which coating material is fed into an oxyfuel gas flame, where it is melted. Compressed gas may or may not be used to atomize the coating material and propel it onto the substrate. | |
| | | free machining Pertains to the machining characteristics of an alloy to which one or more ingredients have been introduced to give small broken chips, lower power consumption, better surface finish, and longer tool life; among such additions are sulfur or lead to steel, lead to brass, lead and bismuth to aluminum, and sulfur or selenium to stainless steel. |
| | | fretting A type of wear that occurs between tight-fitting surfaces subjected to cyclic relative motion of extremely small amplitude. Usually, fretting is accompanied by corrosion, especially of the very fine wear debris. |
| | | fretting corrosion The accelerated deterioration at the interface between contacting surfaces as the result of corrosion and slight oscillatory movement between the two surfaces; Deterioration at the interface between two contacting surfaces accelerated by relative motion between them of sufficient amplitude to produce slip. |
| | | furan Resin formed from reactions involving furfuryl alcohol alone or in combination with other constituents. |