

Corrosion Glossary

partial annealing

An imprecise term used to denote a treatment given cold-worked material to reduce its strength to a controlled level or to effect stress relief. To be meaningful, the type of material, the degree of cold work, and the time-temperature schedule must be stated.

parting

The selective attack of one or more components of a solid solution alloy; eg. dezincification, dealumination etc. See *dealloying*.

parts per billion

A measure of proportion by weight, equivalent to one unit weight of a material per billion (10^9) unit weights of compound. One part per billion is equivalent to 1 mg/kg.

parts per million

A measure of proportion by weight, equivalent to one unit weight of a material per million (10^6) unit weights of compound. One part per million is equivalent to 1 mg/g

passivation

(1) A reduction of the anodic reaction rate of an electrode involved in corrosion. (2) The process in metal corrosion by which metals become *passive*. (3) The changing of a chemically active surface of a metal to a much less reactive state. Contrast with *activation*.

passivator

A type of *inhibitor* that appreciably changes the potential of a metal to a more noble (positive) value.

passive

(1) A metal corroding under the control of a surface reaction product. (2) The state of the metal surface characterized by low corrosion rates in a potential region that is strongly oxidizing for the metal. (3) The state of a metal when its behavior is much more noble than its position in the EMF series would predict. This is a surface phenomena.

passive-active cell

(1) A cell, the emf of which is due to the potential difference between a metal in an active state and the same metal in a passive state. (2) A corrosion cell in which the *anode* is a metal in the *active* state and the *cathode* is the same metal in the *passive* state.

passivity

A condition in which a piece of metal, because of an impervious covering of oxide or other compound, has a *potential* much

plasticity

The property that enables a material to undergo permanent deformation without rupture.

polarization

(1) The change from the open-circuit electrode potential as the result of the passage of current. (2) A change in the *potential* of an electrode during electrolysis, such that the potential of an *anode* becomes more noble, and that of a *cathode* more active, than their respective reversible potentials. Often accomplished by formation of a film on the electrode surface.

polarization admittance

The reciprocal of *polarization resistance* (di/dE).

polarization curve

A plot of *current density* versus *electrode potential* for a specific electrode-electrolyte combination.

polarization resistance

The slope (dE/di) at the *corrosion potential* of a potential (E)/current density (i) curve. Also used to describe the method of measuring corrosion rates using this slope.

polyester

Resin formed by condensation of polybasic and monobasic acids with polyhydric alcohols.

polymer

A chain of organic molecules produced by the joining of primary units called *monomers*.

potential

Any of various functions from which intensity or velocity at any point in a field may be calculated. The driving influence of an electrochemical reaction. See also *active potential*, *chemical potential*, *corrosion potential*, *critical pitting potential*, *decomposition potential*, *electrochemical potential*, *electrode potential*, *electrokinetic potential*, *equilibrium (reversible) potential*, *free corrosion potential*, *noble potential*, *open-circuit potential*, *protective potential*, *redox potential*, and *standard electrode potential*.

potential-pH diagram

See *Pourbaix (potential-pH) diagram*.

potentiodynamic (potentiokinetic)

The technique for varying the *potential* of an electrode in a continuous manner at a preset rate.

potentiostat

An instrument for automatically maintaining an electrode in an electrolyte at a constant potential or controlled potentials with respect to a suitable reference electrode.

	more positive than that at the metal in the active state.	potentiostatic	The technique for maintaining a constant <i>electrode potential</i> .
patina	The coating, usually green, that forms on the surface of metals such as copper and copper alloys exposed to the atmosphere. Also used to describe the appearance of a weathered surface of any metal.	poultice corrosion	A term used in the automotive industry to describe the corrosion of vehicle body parts due to the collection of road salts and debris on ledges and in pockets that are kept moist by weather and washing. Also called deposit corrosion or attack.
pearlite	A metastable lamellar aggregate of <i>ferrite</i> and <i>cementite</i> resulting from the transformation of <i>austenite</i> at temperatures above the <i>bainite</i> range.	Pourbaix (potential-pH) diagram	A plot of the <i>redox potential</i> of a corroding system versus the pH of the system, compiled using thermodynamic data and the <i>Nernst equation</i> . The diagram shows regions within which the metal itself or some of its compounds are stable.
phosphating	Forming an adherent phosphate coating on a metal by immersion in a suitable aqueous phosphate solution. Also called phosphatizing. See also <i>conversion coating</i> .	powder metallurgy	The art of producing metal powders and utilizing metal powders for production of massive materials and shaped objects.
pH	A measure of the acidity or alkalinity of a solution; The negative logarithm of the hydrogen-ion activity; it denotes the degree of acidity or basicity of a solution. At 25 °C (77 °F), 7.0 is the neutral value. Decreasing values below 7.0 indicate increasing acidity; increasing values above 7.0, increasing basicity.	precious metal	One of the relatively scarce and valuable metals: gold, silver, and the platinum-group metals. Also called <i>noble metal(s)</i> .
physical vapor deposition	A coating process whereby the cleaned and masked component to be coated is heated and rotated on a spindle above the streaming vapor generated by melting and evaporating a coating material source bar with a focused electron beam in an evacuated chamber.	precipitation hardening	Hardening caused by the precipitation of a constituent from a supersaturated solid solution. See also <i>age hardening</i> and <i>aging</i> .
physisorption	The binding of an adsorbate to the surface of a solid by forces whose energy levels approximate those of condensation. Contrast with <i>chemisorption</i> .	precipitation heat treatment	<i>Artificial aging</i> in which a constituent precipitated from a supersaturated solid solution.
pickle	A solution or process used to loosen or remove corrosion products such as scale or tarnish.	precracked specimen	A specimen that is notched and subjected to alternating stresses until a crack has developed at the root of the notch.
pickling	Removing surface oxides from metals by chemical or electrochemical reaction.	primary current distribution	The current distribution in an <i>electrolytic cell</i> that is free of <i>polarization</i> .
pitting	<i>Localized corrosion</i> of a metal surface, confined to a point or small area, that takes the form of cavities or pits.	primary passive potential (passivation potential)	The potential corresponding to the maximum active current density (critical anodic current density) of an electrode that exhibits active-passive corrosion behavior.
pitting factor	Ratio of the depth of the deepest pit resulting from corrosion divided by the average penetration as calculated from weight loss.	primer (prime coat)	The first coat of paint applied to a surface. Formulated to have good bonding and wetting characteristics; may or may not contain inhibiting pigments.
plane strain	The stress condition in <i>linear elastic fracture mechanics</i> in which there is zero strain in a direction normal to both the axis of applied tensile stress and the direction of crack growth (that is, parallel to the crack front); most nearly achieved in loading thick plates along a direction parallel to the plate surface. Under plane-strain conditions, the plane of	principal stress (normal)	The maximum or minimum value at the <i>normal stress</i> at a point in a plane considered with respect to all possible orientations of the considered plane. On such principal planes the shear stress is zero. There are three principal stresses on three mutually perpendicular planes. The state of stress at a point may be (1) uniaxial, a state of stress in which two of the three principal stresses are zero, (2) biaxial, a state of stress in which only one of the three principal stresses is zero, and

fracture instability is normal to the axis of the principal tensile stress.

plane stress

The stress condition in *linear elastic fracture mechanics* in which the stress in the thickness direction is zero; most nearly achieved in loading very thin sheet along a direction parallel to the surface of the sheet. Under plane-stress conditions, the plane of fracture instability is inclined 45° to the axis of the principal tensile stress.

plasma spraying

A *thermal spraying* process in which the coating material is melted with heat from a plasma torch that generates a nontransferred arc: molten coating material is propelled against the base metal by the hot, ionized gas issuing from the torch.

plastic deformation

The permanent (inelastic) distortion of metals under applied stresses that strain the material beyond its *elastic limit*.

(3) triaxial, a state of stress in which none of the principal stresses is zero. Multiaxial stress refers to either biaxial or triaxial stress.

profile

Anchor pattern on a surface produced by abrasive blasting or acid treatment.

protective potential

The threshold value of the *corrosion potential* that has to be reached to enter a *protective potential range*. The term used in *cathodic protection* to refer to the minimum potential required to suppress corrosion.

protective potential range

A range of *corrosion potential* values in which unacceptable corrosion resistance is achieved for a particular purpose.