Reunion Internationale des Laboratories d'Essais et
de Recherches sur les Matériaux et les Constructions

Technical Committee 105 CPC

CONCRETE POLYMER COMPOSITES
TERMINOLOGY AND DEFINITIONS

Prague, October 1991

Committee Members:

BAREŠ, Richard A. - Chairman *)
CARDON, Albert H. - ordinary member
CHANDRA, S. - ordinary member
CZARNECKI, Lech - Secretary
FIEBRICH, M. - corresponding member
FOWLER, David W. - corresponding member
HRANILOVIC, M. - ordinary member
JUSTNES, Harald - ordinary member
KOBLISCHEK, Peter J. - ordinary member
KREIS, R. - corresponding member
OHAMA, Yoshihiko - ordinary member
PATUROEV, V. V. - corresponding member
PUTERMAN, Moshe - corresponding member
SANDROLINI, Franco - ordinary member
SARVARANTA, Leena - corresponding member
SASSE, H. R. - corresponding member
SCHORN, H. - ordinary member
SHUTOV, F. A. - ordinary member
STAYNES, B. W. - corresponding member.
STEIJAERT, P. D. - ordinary member
VAN GEMERT, D. - ordinary member

*) ITAM-CSAS, Vyšehradska 49, Prague 2, CSFR 128 49

INTRODUCTION

The book is the result of lots of working sessions, warm argues and discussions and some time even quarrels of twenty five specialists from around the world universities and research centres - from seventeen countries - gatherd together in RILEM Technical Committee TC 105 CPC "Concrete Polymer Composites" in 1986. For this reason the book is not just another set of selected terms in the field of materials. After five years of hard work together we have found a common language for communication which we would like to share with all members of the world community interested in composites. There is not only the lexicon but also evidence of our way of a thinking of polymer composite materials and meanings. To some extent the book itself is also an image of the main categories in composites science, viz. Structure, Interaction and Synergy. The lexicon contains more than 400 entries. Separately each of those could be described in various ways. For the purpose of this book, the terms have been defined in particular meaning to establish uniform interdisciplinary system of Concrete - Polymer Composites. We hope that the lexicon users share the opinion that this "whole is something more than just the sum up of singularities". This Aristotele's dictum (350 B.C.) can be treated as the first definition of composite materials.

ABRASION

The wearing away of a part of material by rubbing or grinding against another surface

ABSORPTION, WATER (MOISTURE)

The ability of a material to absorb and retain water, expressed by the amount of relative mass increase

ACCELERATOR

A compound added to a mixture in order to in crease the rate of a reaction (cement hydration, polymerization, etc.)

ACTIVATOR

A compounding material used in small proportions to increase the effectiveness of an accelerator or to start the decomposition of an initiator

ADDITIVE

A compound added in small amounts (usually <5% of binder weight) to a mixture in order to enhance or suppress a certain property of the mixture

ADHESION

The attraction between two solid materials in intimate contact due to interaction of surface molecules

ADMIXTURE

A compound added to a mixture in order to modify properties and/or reduce material costs

AFTERCURE

A progress of curing a composite material produced from thermosetting resin or rubber, stopping treatment

AGENT, ANTIFOAMING (ANTIFOAMER), DEFOAMING

A substance added to a material or composition to control the content of gases or prevent foaming, or break down the foam formed

AGENT, ANTISTATIC

A chemical used by compounding in a material or for coating of the product, having the effect of decreasing the surface resistivity to avoid generation of static electricity on the surface and thereby attraction of dust

AGENT, BLOWING

A compounding material used to produce gas by chemical or thermal action, or both, in manufacture of hollow or cellular articles

AGENT, COUPLING

A functional monomer in a polymer composite acting as a chemical "bridge" between the polymer phase and the inorganic phase(s)

AGENT, CROSS-LINKING

A substance which reacts with the oligomer or linear polymer to form chemical bonds between polymer chains

AGENT, CURING

see HARDENER

AGENT, DEFOAMING

see ANTIFOAMER

AGENT, DISPERSING

A surface-active substance used to facilitate the suspension of solid compounding materials in a liquid medium and to stabilize the dispersion thereby produced

AGENT, EMULSIFYING

A surface-active substance used to facilitate the dispersion of an immiscible liguid compounding material in another liquid and to stabilize the emulsion thereby produced

AGENT, FOAMING

see AGENT, BLOWING

AGENT, REINFORCING

A compound, not basically involved in the hardening process, used to increase the resistance of the material to mechanical forces

AGENT, RELEASE (AGENT, MOLD RELEASE)

A substance (external mold release agent) coated or baked on an interior mold surface, or a substance (internal mold release agent) added to a compound to facilitate the removal of the molded product from the mold

AGENT, WETTING (IN MIX)

A substance used to reduce the surface tension of a mix and thereby facilitate spreading or impregnation of a surface by the mix

AGGLOMERATE

1. A material artificially built up from particles of parts bonded together by binder
2. A cluster of particles of one or more compounding materials in a composite contained in a continuous phase (matrix)

AGGLOMERATE, LATEX

A cluster of polymer or rubber particles in a colloidal aqueous suspension of such particles

AGGLOMERATE (OF LATEX)

Reversible or irreversible joining together of latex particles

AGGREGATE

A particular material such as natural sand, manufactured sand, gravel, crushed gravel, blast furnace slag, or others

AGGREGATE, BINARY

An aggregate with particles of two sizes

AGGREGATE, COARSE

An aggregate retained in a portion of 85% or more by weight on the 5-mm rectangulars wire sieve

AGGREGATE, CONTINUOUS

A mixture of n particle types of different size represented in the mix in accordance with a continuous grading curve

AGGREGATE, DISCONTINUOUS

A mixture of n particle types of different size represented in the mix in accordance with a gap grading curve (discontinuous grading curve)

AGGREGATE, FINE

An aggregate entirely passing through the 10-mm wire sieve and 85% or more by weight passing through the 5-mm rectangular wire sieve

AGGREGATE, MONOTONOUS

An aggregate with all particles of the same size

AGGREGATE, TERNARY

An aggregate with particles of three sizes

AGING

The result of internal chemical and physical changes of material under general loading during an interval of time

AGING (PROCESS)

Irreversible change of material properties during exposure to a general loading (mechanical, environmental, etc.) for an interval of time

AGING, ACT OF

Exposure of materials to an environment for an interval of time

AGING, SHELF

Aging during storage

ANALYSIS, SIEVE

The test for determining the particle size of a granular or powdery material by the use of sieves

ANISOTROPY, MATERIAL

Different values of physical properties in different directions of a material

ANNEALING

Heating to and holding at a suitable temperature and then cooling at a suitable rate for relieving the strain caused in the product by heat or chemical stress

BATCH (MATERIAL COMPOUND)

The product of one mixing operation

BINDER

A geometrically continuous solid phase of a composite material

BINDER, CONTENT OF

The ratio of the amount (in weight or volume %) of the binder to the total amount of the materials used in a composite material

Note: The binder content should be based on volume percentage if possible

BINDER, FILLED

Particular composites of the First Type

BLEEDING

Migration of constituents of a binder to the surface

BLISTER

A cavity or sac that deforms the surface of the material by the pressure of fluid contained therein

BLOOMING (OF MATERIAL)

The efflorescence of a liquid or solid on the surface of a material

BLOW (OF CELLULAR MATERIAL)

The volume expansion during the production of expanded material

BODY

A geometrically limited continuum in space with specific boundaries

BOUNDARY, PHASE

The surface in which one phase is in contact with another

BREAKDOWN, FATIQUE

Deterioration of a test piece or product resulting from cyclic deformation

BULK, SOLID PHASE

Solid phase filling a certain volume of space not characterized by its geometrical form

CATALYST

A compound added to a mixture in order to increase the rate of a reaction (cement hydration, polymerization, etc.) without being consumed itself by the chemical reaction

CELL

see PORE

CELL, CLOSE

see PORE, CLOSE

CELL, OPEN

see PORE, OPEN

CEMENT

1. A dry powder from silica, alumina, lime, iron-oxide and magnesia, combined together to form hydraulic compounds which form a hardened paste when mixed with water; it is used as a binder for aggregate
2. A material which glues individual bodies together

COAGULATION

1. Irreversible agglomeration of particles dispersed in a latex (polymer dispersion)
2. Irreversible agglomeration of colloidal particles precipitated (originally dispersed) in a colloidal solution (by addition of an electrolyte or by heating or cooling)

COEFFICIENT OF THERMAL CONDUCTIVITY

The ratio of the amount of heat flow per unit time through a unit area of the isothermal plane, perpendicular to the direction of the heat flow, to the thermal gradient in this direction, expressed in $Wm^{-1}K^{-1}$

COEFFICIENT OF THERMAL EXPANSION, LINEAR

The value of relative change of length of a material by heat, expressed per one degree change in temperature

COEFICIENT OF THERMAL EXPANSION, VOLUME

The value of relative change of a material volume by heat, expressed per one degree change in temperature

COEFFICIENT, VISCOSITY

The shearing stress necessary to induce a unit velocity flow gradient in a material

COHESION

The interaction among molecules, atoms or ions within a solid material or between two different solid materials being in intimate contact that keeps the continuum together

COLLOID

A mixture of which at least one component is subdivided physically in such a way that one or more of its dimensions lies in the range between approximately a nanometer and a micrometer

COMONOMER

One of the two or more monomer species that polymerize to form a polymer

COMPATIBILITY

A property such that two or more kinds of materials have affinity with one another to form a solution or mixture

COMPOSITE

see MATERIAL, COMPOSITE

COMPOSITES, CONCRETE-POLYMER (C-PC)

A particular or hybride composite of the type of concrete using polymers

COMPOUND

An intimate mixture of polymer(s) with all the substances necessary for the final material

CONCRETE (MORTAR)

A granular composite material which is made by mixing a cement binder with sized aggregates

CONCRETE, FIBRE REINFORCED

A concrete (mortar) with addition of short fibres (organic or inorganic) for modification of mechanical and physical properties

CONCRETE, POLYMER (PC)

A composite in which aggregate (filler) is bonded by polymer

CONCRETE, POLYMER-CEMENT (PCC)

A composite where either a non-reactive polymer (latex) or a reactive monomer or oligomer (resin) is added to the fresh cement concrete mix

CONCRETE,POLYMER IMPREGNATED (PIC)

A composite in which hardened concrete (mortar) is impregnated with a reactive monomer (resin) in fluid form which is subsequently polymerized in situ

CONCRETE, POLYMER-MODIFIED (PMC)

A cement concrete (mortar) where small amounts of polymer are added to the fresh mix in order to alter the rheology of the mix, not contributing significantly to the binder properties of the hardened composite

CONCRETE, POLYMER-SILICATE (PSC)

A concrete (mortar) in which a mixture of water glass and furane resin or other resins serve as binder

CONTACT, DIRECT FORCE

The stress field of a loaded composite system in which the transmission of inner forces between two adjacent phases is granted predominantly by normal stresses

CONTENT, MOISTURE

see CONTENT, WATER

CONTENT, POLYMER

The content of polymer in volume or mass in a composite

CONTENT, UNIT BINDER

The quantity of the binder per unit volume of freshly mixed polymer concreate (mortar)

CONTENT, UNIT POLYMER

The quantity of total solid materials in a polymer dispersion per unit volume of freshly mixed polymer-modified concrete (mortar)

CONTENT, WATER

The amount of moisture in a material, not including water of crystallization and/or bond water, expressed as mass percentage of the oven-dried material

CONDITIONING

The process of exposing the material to environmental specific temperature and relative humidity for a stipulated period of time, for the purpose of limiting the variation in and improving the reproductibility of test results

CONTITIONS, ENVIRONMENTAL

The aggregate of all conditions (such as contamination, temperature, humidity, radiation, magnetic and electric fields,shock, and vibration) that externally influence the performance of an item

CONDUCTION, THERMAL

The flow of hest (not by radiation or connection and without the motion of the material) in a material

CONTINUUM, HETEROGENEOUS

A medium, the whole volume of which consists of (identical) different solid and fluid phases, in which at least the solid phases are connected by firm bonds (and such that structural defects do not harm its inherent property)

COPOLYMER

A polymer formed from two or more types of monomers or oligomers

Note: Copolymers may be classified as

-statistical, in which the chaining of structural units is of random character

-blocked, in which the chaining proceeds by identical blocks of structural units

-grafted, in which chains of another polymer join the chains of the given polymer

-alternating (rarely), in which the structural units are alternatively repeated

COPOLYMERIZATION

The process of polymerizing two or more monomers

CRACK (CRACKING)

A gap or separation formed in a brittle or brittle-like material

CRACKING, STRESS

The stress which causes cracking in a material

CRACKING, ENVIRONMENTAL STRESS

Stress cracking accelerated by the environment

CRATER

A small,shallow surface imperfection

CREEP

Time dependent evolution of strain under constant stress state in a material

CROSS-LINK

A chemical bond bridging one polymer chain to another

CROSS-LINKING (ACT OF)

Formation of chemical bonds between oligomers or polymeric chains to form a network or cross-linking structure which is not reshapable any more by heat or pressure

CRYSTALLIZATION, POLYMER

An arrangement of previously disordered polymer segments of repeating patterns closer to geometric symmetry

CURE

An irreversible process during which a monomer compound through a change in its chemical structure (e.g. cross-linking) becomes less mobile

CURE, POST

Heat or radiation treatment, or both, to which a cured or partially cured thermosetting (plastic or rubber) composite is subjected to enhance the level of one or more properties

DECOMPOSITION, THERMAL

The decomposition of a body by heat performed by formation of simple compounds, depolymerization, or change in physical and chemical properties

DEFORMATION, ELASTIC

That part of the total deformation which recovers instantly when the stress in removed

DEFORMATION, ELASTIC DELAYED

That part of the total deformation which gradually recovers after instant recovery in the course of time

DEFORMATION, PERMANENT

That part of the total deformation which remains when the stress is removed

DEFORMATION, PLASTIC

The deformation of a solid material caused by application of forse, such that the material does not recover its original shape

DEFORMATION, TOTAL

The deformation of a solid material caused by application of force

DEFORMATION, VISCOUS

That part of the total deformation of a body under constant loading rising in time

DEFORMATION, ULTIMATE

The deformation of a solid material at the time of rupture

DEGRADATION

The detrimental change in the chemical structure of a material, caused by heat, light, stress, and/or environment

DEGRADATION, THERMAL

The detrimental change of properties connected with a change in chemical structure due to an increase in temperature resulting from external application or internal generation of heat

DEGASSING

Removal of air bubbles, etc., included in an unhardened mixture

DEGREE OF POLYREACTION

1. The average number of structural units in the polymer
2. The degree of conversion given by the ratio of reacted to reactable monomer units

DENSITY

The mass (in air) per unit volume of a material

DENSITY, APPARENT

see DENSITY, BULK

DENSITY, BULK

The mass of a porous material per unit volume including any pores and air voids present

DENSITY OF PHASE DISPERSION

The volume of dispersed particles in a representative volume unit of structural system

DENSITY, SPECIFIC (OF COMPOSITE)

The unit weight of a representative volume

DENSITY, VOLUME

see DENSITY, BULK

DEPTH, IMPREGNATION

The distance from the surface to the level at which minimally half of continuous pores are saturated by impregnant

DETERIORATION

The loss of some initial material properties due to environmental exposure as a result of development of a permanent change in physical properties

DIAGRAM, STRESS-STRAIN

A diagram showing the relation of stress to strain in a material test,in which the values of stresses are plotted as ordinates and those of strains as abscissas

DIAGRAM, FATIQUE (S-N DIAGRAM)

The diagram with the stress S on the ordinate and the number of cycles N on the abscissa

DIFFUSIBILITY

The ability of a material to allow the passage of mass, in the form of discrete atoms or molecules.
Compare also PERMEABILITY

DILUENT

An agent decreasing the viscosity of the composition

DILUENT, NON-REACTIVE

The diluent which can evaporate.

DILUENT, REACTIVE

The diluent having the ability to be chemically incorporated in the macromolecule.

DIRECTION, CROSSWISE (TRANSVERSE)

The direction perpendicular to the direction of a dominating length

DISPERSION, POLYMER

A system in which very fine particles (of below 1 um) of a polymer are dispersed in a liquid.

DISPERSION (ACT OF)

The application of shearing forces to distribute one or more compounding materials uniformly throughout the mass of a material continuum

DISPERSITY (OF THE SYSTEM)

The ratio of the surface to the volume of dispersed phase in the representative volume of the system

DURATION

see LIFE, POT

DURABILITY

The ability of a material to withstand mechanical and environmental exposure during a certain time

EDGEWISE

Direction parallel to the layers of a layered product

ELASTICITY

Ability of a material to recover shape when stress is removed

ELASTOMER

A macromolecular material that, under service conditions, returns rapidly to approximately its initial dimensions and shape after substantial deformation by stress and release of the stress

ELONGATION

The strain of a material under tensile stress, expressed by the ratio of the value of strain to the original length

ELONGATION, ULTIMATE

The elongation at the time of rupture

EMULSIFIER

A surfactant used to uniformly distribute a compound in a liquid where it is not soluble.
see EMULSION, LATEX and SURFACTANT

EMULSION

A system in which very fine particles of a liquid or a solid are dispersed in another liquid that does not dissolve the particles

ENVIRONMENT, AMBIENT

External surrounding in which the given system exists

EROSION

Wearing away of product surfaces by the washing action, mainly physical, of rapidly moving liquids and solid particles

EXOTHERM

The liberation or evolution of heat during the curing of a plastic product

EXTENDER

A material used to augment the binder in a compound.
see ADMIXTURE

FACTOR, BULK

The quotient of density of the material in its processed form, divided by its apparent density in the unprocessed form

FAILURE, COHESIVE (OF BONDED ASSEMBLY)

A repture occurring entirely within any single uniform element of the assembly

FATIGUE

A phenomenon in which a material subjected to fluctuating stresses exhibits a lower strength than when subjected to a constant stress.
see DIAGRAM FATIQUE, LIFE FATIQUE and LIMIT FATIQUE

FATIGUE, DYNAMIC

The deterioration of a material by repeated deformation

FILLER

A solid compounding material.
see AGGREGATE

FILLER (DISPERSED PHASE)

Geometrically discontinuous constituent of the composite

FILLER, GEL

That portion of binder in which an intimate mixture of filler and resin has not been reached

FILLER, BONDED

A particulate composite of the second and third type

FLATWISE

The direction perpendicular to the layers of a product

FLEXIBILITY

The quality of being pliable

FLOW

1. The ability of a pile of a fresh mixture to spread when subjected to jolting
2. Part of those deformations leading to plasticity

FOAM

A cellular structure material formed by the stabilization of gas bubbbes in a matrix

FOAM, SYNTACTIC

A special kind of gas-filled polymeric material, consisting of a polymer matrix and a filler of hollow spherical particles (microspheres)

FRICTION

The resistance that arises when a surface of one substance moves over an adjoining surface of another substance

FRICTION, KINETIC

The resistance arising during movement

FRACTION, STATIC

The resistance opposing the starting of movement

FUNCTIONALITY

In a polymer forming reaction: the number of functional groups upon which each of the material compounds can react.

Note: A compound having two functional groups is said to be bifunctional and a compound having three functional groups is called trifuctional

GEL

1. A semisolid system consisting of a network of solid colloidal particles in which liquid is held
2. The initial jelly-like solid phase that develops in the course of curing of a thermosetting resin from a liquid state
3. With respect to vinyl plastisols, a state between liquid and solid that occurs in the initials states of heating, or upon prolonged storage

Note: All three types of gels have very low strengths and do not flow like a liquid. They are soft and flexible and may repture under their own weight unless supported externally

GEL, CEMENT

The colloidal material that makes up the major portion of the porous mass of which mature hydrated cement paste is composed

GELLING, GELATION

The transformation of a reactive mixture during the hardening process from a liquid state to a jelly-like state

GRAINS

Dispersed particles, mostly observable by the naked eye

GYPSUM, POLYMER IMPREGNATED

A gypsum composite material impregnated with a monomer, in some cases including a prepolymer or polymer, which in subsequently polymerized in situ

HARDENER

A chemical compound causing solidification of reactive monomers and oligomers (hardening of the resin)

HARDENING

1. The transformation of the material from its viscous or liquid state into the solid state due to the chemical reaction
2. Increasing of the modulus of elasticity of a material during its plastic deformation (stress hardening)

HARDNESS

Resistance of the material against indentation or scratching by another harder body

HEAT BUIID-UP

The accumulation of thermal energy generated within a material as a result of hysteresis, evidenced by an increase in temperature

HETEROPOLYMER

A polymer produced from a monomer, which cannot homopolymerize, by copolymerization with a monomer of another type

HOMOPOLYMER

A polymer formed from a single monomer species

Note: Also polycondensate, if the constitutial unit of the polymer is homogeneous, is called a homopolymer

IMPREGNANT

A material which is used for impregnation of the base structure (concrete, mortar) during the polymer impregnated materials production, and consists of a monomer (in some cases, including prepolymer and polymer), catalyst,promoter, cross-linking agent, plasticizer, etc.
see IMPREGNATION; IMPREGNATION DEPTH; IMPREGNATION PARTIAL;

IMPREGNATION

Saturation or penetration of a base structure of open porosity, such as hardened concrete and mortar,with a monomer, prepolymer, polymer, etc.

IMPREGNATION, PARTIAL

Saturation or penetration of a base structure of open porosity with a monomer, prepolymer, polymer, etc. to a limited depth from the surface

IMPREGNATION, SKIN

Penetration of a base structure of open porosity with a monomer, prepolymer, polymer, etc. to form a thin skin on the inner surface of pores

INCLUSION

Separate individual particles in a composite

INCOMBUSTIBILITY

The ability of a material to not ignite, burn, or support fire

INDEX, ABRASION RESISTANCE

The ratio of the abrasion resistance of a material to that of a standard material under the same specified conditions and expressed as a ratio of volume losses of both materials (percentage)

INFRASTRUCTURE

(Super)Structure of individual phases (solid and fluid) present in the composite, abstractly separated in the same configuration (geometrical arrangement)

INHIBITOR

A substance used to restrain or suppress a chemical reaction

Note: Inhibitors, unlike catalysts, are consumed during the reaction

INITIATOR

A reactive substance which during decomposition forms free radicals able to start a chemical reaction such as polymerization of monomers or hardening reaction of liquid resins

INTERFACE

The surface between two different, physically distinguishable media

see VALUE, INTERFACE

INTERFACES/INTERPHASES

Any transition zone between phases in polyphase materials (e.g. grain boundaries, interfaces in composites, etc.)

INTERPHASE (REGION OF)

The contact region, where two phases meet and interact with each other, with properties differing from those of the bulk material on either side of the interphase

see INTERFACE

ISOTROPY, MATERIAL

The quality of a material having the same physical aracteristics in all directions

KNEADER

A machine for mixing and homogeneously kneading a mixture of high viscosity by severe shear action

LATEX

A colloidal dispersion of a polymer such as natural rubber, synthetic rubber, or other elastomer

Note: The NATURAL LATEX is an emulsion obtained from a plant and the SYNTHETIC LATEX is made mainly by emulsion polymerization

LAYER

A planar part of a composite having a different composition than the adjacent planar part

LENGTH, CHAIN

see POLYMERIZATION, DEGREE OF

LENGTHWISE

A direction optionally specified, e.g. parallel to the dominating direction, of the test piece, or in which an anisotropic material is stronger

LIFE, FATIGUE

The number of cycles or time that a material sustains before breaking under repeating stresses

LIFE, POT

The period of time during which a reacting thermosetting (plastic or rubber) composition remains suitable for its intended use (processing) after mixing with a reaction-initiating agent

LIFE, SHELF

The maximum storage period for which a material remains usable for the intended processes

LIFE, STORAGE

see LIFE, SHELF

LIFE, WORKING

see LIFE, POT

LIMIT, ELASTIC

The greatest stress which a material is capable of sustaining without any permanent strain remaining upon complete release of the stress

LIMIT, EXPLOSIVE

The range of vapour concentrations of a compound in air at room temperature and normal atmospheric pressure (NTP) that will support combustion

LIMIT, FATIQUE

The maximum stress under which a material can sustain practically infinite repeating cycles

LOADING,MONOMER

The quantity of the impregnant contained in substrate immediately after impregnation

LOADING, POLYMER

The weight fraction of the polymer contained in polymer impregnated base structure (concrete, mortar)

LONG-TERM STRENGTH

The ability of a material or structure to maintain near-original strength properties as it ages

LOSS, HYSTERESIS

Loss of mechanical energy due to internal microfractures of a material during loading

LOSS, VOLATILE

The loss in mass by vaporization of the substances contained in a product or component materials

MASS, MOLECULAR

The relative mass of a molecule of a substance referred to that of the isotope of carbon (^{12}C) taken as 12. For a polymer, since its molecular weight is not constant, consisting of molecules of different molecular mass within the polymer homologue, the mean molecular mass (M) in used

MASTERBATCH

A homogeneous mixture of monomer(s) and one or more materials in known proportions for use as a raw material in the preparation of the final compounds

MASTIC

see PASTE

MATERIAL

1. A space region filled with any (mostly solid) matter (in mechanics of materials considered as continuum with representative volume element available for homogenization)
2. Any solid mono/polyphase, mono/multicomponent substance used in engineering applications

MATERIAL, ACTUAL

A material as it is used and encountered in technical practice

MATERIAL, BRITTLE

A material which fails suddenly without significant deformation

MATERIAL, COMIXED

Every material system in which the components do not show synergic interaction

MATERIAL, COMPOUNDING (INGREDIENT)

A substance used as part of a material

MATERIAL, COMPOSITE

A solid polyphase material, whose phases have macroscopically distinguishable boundaries and cannot be mutually transformed in each other by any treatment, which attains properties no attainable by any one of the constituing phases itself neither by the simple summation of them

MATERIAL, COMPOSITE HYBRID

A composite of different solid phases including particular as well as fibre constituents

MATERIAL, COMPOSITE PARTICULAR

A composite in which dispersed components have the form of particles with no significant size differences in each direction

MATERIAL OF FIRST TYPE, COMPOSITE

A solid material system in which the dispersing phase, the matrix, prevails, and the elements of the dispersed phase are segregated in it, not being in direct force contact

MATERIAL OF FOURTH TYPE, COMPOSITE

A disjugated material system (agglomerate, particular) in which the only dispergating phase is formed by fluid

MATERIAL OF SECOND TYPE, COMPOSITE

A solid material system in which the elements of the dispersed phase are aggregated to be capable of direct force contact and in which the rest of the space in the structural system in filled with matrix and closed fluid phase

MATERIAL OF THIRD TYPE, COMPOSITE

A solid material system in which the elements of the dispersed phase are aggregated to be capable of direct force contact (in the form as in the second type of composites) and in which the rest of the space in structural system is filled with matrix and open fluid phase, the free inner surface thus being connected with the ambient environment

MATERIAL, FLEXIBLE

A material that has a modulus of elasticity in flexure, or, if that is not applicable, in tension, not greater than 70 MPa under stated conditions

MATERIAL, IDEAL

A material (mass medium) which theoretically fulfills the given requirements, and only these, within the given boundaries

MATERIAL (CONTINUUM), NON-HOMOGENEOUS

A space region filled with different solid and liquid phases and containing non-filled discrete spaces, bonds defects, as inner cracks or disjugated areas. In mechanics of materials considered as a continuum without any representative volume element for homogenization

MATERIAL (CONTINUUM), POROUS

A solid material system containing many dispersed structural spaces throughout (pores, cells), either open, closed, or both, which are filled with a fluid phase

MATERIAL, REAL

A material which corresponds in all respects to the respective actual structural material but is not impaired by its incidental imperfections, defects, variability of quality, etc.

MATRIX

The geometrically and phase continuous part of the composite, bearing and binding the dispersed constituents
see PHASE, DISPERSING

MECHANICS OF MATERIALS

A scientific discipline concerned with the deformation behaviour of material structures under loads of any physical or chemical origin

MECHANICS OF MATERIALS, PHYSICO-CHEMICAL

A special branch of the mechanics of material investigating stress and strain states arising in a material medium as the result of physical and chemical processes taking place during deformation. It is an interdisciplinary science between the physics of the solid phase,the physical chemistry of surface phenomena and dispersion systems, and mechanics, and it is based on the thermodynamics common to all of these disciplines

Note: The task of physico-chemical mechanics in the field of structural materials is elucidation of the laws governing the motion of material elements in solids and determination of the properties of materials as the functions of the composition, structure, and deformation properties of the substances which constitute them and the configuration of the distribution of these substances in the material under the influence of the force field and the physico-chemical cooperation of the ambient environment. The relation to the physics of solids having been outlined above, it is now desirable to characterize the scope of physico-chemical mechanics with respect to the smallest particles concerned. Such a boundary cannot be defined unambigously because it depends on the form of existence of every individual material (agglomerate, polycrystal, amorphous mass) and on the influence of this form on the deformation behaviour of the given material. When placing a technical accent on the solid component of the material it is possible-with a certain reservation-to consider such small particles as are still governed by the Newtonian principles of motion, or for which these principles can be abstracted,as a boundary of the scope of physico-chemical mechanics

MEDIUM (MATERIAL), HOMOGENEOUS MASS

A one-phase bulk material

MEGALLOID

A colloidal system at the level of superstructure

MICROCRACKS

Fine cracks which may extend in a network on or under the surface of a material

MICROFILLER

A solid compounding material in finely divided form (which might interact with the polymer through the surface), added to the polymer for modification of properties of the binder.

Note: The size of microparticles is represented by unit size mesh

MICROMECHANICS

A special range of the mechanics of materials in which the physical and chemical aspects are considered as given properties of the defined complex system, for the description of which the methods of mechanics of the continuum are used

MICROSTRUCTURE

The spetial configuration of chemical elements (atoms, molecules) connected by mutual bonds

MICROVOLUME

The minimum volume of phase (or particle) having still the average properties of phase (or particle)

MIGRATION

Diffusion and/or penetration of plasticizer, etc., between two contacting materials

MIX

An adequate mixture of binder with other material(s)

MIX, POLYMER-CEMENT (READY)

An industrially prepared mixture of cement and polymer, serving as binder of PCC or PMC

MODIFIER

A substance in the composition which significantly changes some of the properties of the mixture or product

MODULUS OF ELASTICITY

The quotient of the applied stress (tensile, bending, compressive, shearing, or twisting) divided by the strain produced in a material

MODULUS OF ELASTICITY, APPARENT

The ratio of stress to strain at an arbitrary point of the stress-strain curve in the region beyond the elastic limit

MONOMER

A low molecular mass substance consisting of molecules capable of reacting with like or unlike molecules to form a polymer

MORTAR

A composite material which is made by mixing a binder with fine aggregate

OLIGOMER

A substance composed by polycondensation of only a few but always less than thirty monomer units repeatedly linked to each other, such as a dimer, trimer, tetramer, etc., or their mixtures, with molecular weight under some thousands

Note: The physical properties of an oligomer vary with the addition or removal of one or a few constitutional units from its molecules

PARTICLES, FICTIVE

A dispersed particle increased by half of the mutual distance between particles, providing the direct force transmission

PARTICLES, GRANULAR

Particles having approximately the same spatial dimensions

PASTE

An easily molded mixture consisting of binder (e.g. cement, polymer dispersion, liquid resin, catalyst, promoter) and filler, excluding the aggregates, used to make joints or repair unevennes

PERMEABILITY

The ability of a material to be penetrated by fluid phase

Note:

1. For a homogeneous material, permeability of gas according to Fick's a law is equal to the product of the diffusion coefficient and the solubility coefficient of the gas or vapour
2. As homogeneous material in this sense it is possible to consider the composites of I.type without open porosity, e.g. polymer containing fillers or reinforcement or closed pores,or all, uniformly distributed throughout the mass
3. Generally the permeability of a liquid through a body is expressed by the quantity of the gas (vapour) or liquid passing through a unit thickness of a unit area, in a unit time, at a specific temperature
4. The permeability of water vapour is specially called the moisture permeability

PERMEANCE

The permeation rate divided by the difference in pressure of a gas (vapour) or liquid between opposite faces of a solid body

PHASE

Every physically quasi homogeneous constituents of a material physically separated from other quasihomogeneous constituents by interfaces and/or interphases, differentiated by the state of matter (solid phase, fluid, i,e, liquid, gaseous phase) and/or by the chemical nature

PHASE, DISCONTINUOUS FLUID

A fluid phase present in free spaces of discontinuously porous materials

PHASE, DISPERSING

A phase supporting the dispersed constituents, in a composite most frequently called a matrix

PHASE, DISPERSED

A phase consisting of dispersed constituents of the composite

PHASE, PRIMARY

The solid phase in a material system

PHASE, SECONDARY

The fluid phase in a material system

PLASTICS

High polymers, usually synthetic, combined with other ingredients (colorant, plasticizers, etc.) and artificially formed (shaped, molded etc.) into a useful shape

PLASTICITY

The tendency of a material above its elastic limit to remain deformed after stress removal

PLASTICIZER

A substance incorporated in a material to increase its workability, dispersibility, deformability, or plasticity

PLASTISOL

A sol-state paste made by dispersion of a powdery resin in a plasticizer
see SOL

POINT, FLASH

The lowest temperature at which the vapour of a combustible liquid can be ignited in air

POINT, GEL

The stage at which a liquid begins to exhibit pseudoelastic properties

Note: The stage may be selected as the inflection point on a viscosity-time plot

POINT OF TRANSITION

The temperature at which reversible physical changes occur in a polymeric material

POINT, SOFTENING

The temperature at which a polymer undergoes a deformation by heating under a constant load

POINT, YIELD

The first stress in elasto-plastic material, at which an increase in strain occurs without an increase in stress

POLYADDITION

A polyreaction implying the transfer of hydrogen atoms between the functional groups of monomers or oligomers, without expelling simple molecules like water (e.g. epoxy resins)

POLYCONDENSATION

A step-wise polyreaction implying a chemical reactions between at least two functional groups of monomers or oligomers accompanied with the elimination of simple molecules like H_2O, CO_2 (e.g. preparing polyester oligomers)

POLYESTER (PES)

A polymer in which the propagating chain is linked by ester bonds

POLYMER

A material (generared by polyreaction) consisting of (macro)molecules characterized by the repetition (neglecting ends, branch junctions and other minor irregularities) of one or more types of monomeric units, mutually linked by covalent bonds

POLYMER, FILLED

A particular composite of the first type

see SYSTEM, SEGREGATED; MATERIAL OF FIRST TYPE, COMPOSITE

POLYMERIZATION

A selfpropagating chain-type polyreaction in which monomers with unsaturated bonds are linked together to form polymers through the opening of the unsaturated bonds (e.g. formation of polystyrene)

POLYREACTION

A chemical reaction in which monomers are linked together to form polymers

see POLYADDITION, POLYCONDENSATION, POLYMERIZATION

POLYREACTION, DEGREE OF

see DEGREE OF POLYREACTION

POLYREACTION, EMULSION

A polyreaction performed by emulsifying monomers and then polyreacting in the emulsified state

POLYREACTION, SOLUTION

A polyreaction performed by dissolving monomers and then polyreacting in the solution

POLYREACTION, RADIATION

A polyreaction which is generated or initiated by radiation

POLYREACTION, THERMAL

A polyreaction which is generated or initiated by heat

POLYREACTION, THERMAL-CATALYTIC

A polyreaction in which a heardening (catalytic) system is initiated by heat

POLYREACTION, PROPER CHAIN

A process in which numerous molecules of one or several monomers are fixed to active centres, pre-generated in reactive environment by radical or ion reaction, resulting in mono- or co-polymer of high molecular weight (of the order of hundreds of thousands to millions)

POLYSTYRENE (PS)

A polymer based on styrene or its derivates

POLYVINYLACETATE (PVAc)

A polymer prepared by polymerization of vinyl acetate as the sole monomer

Note: PVAc can make a copolymer with polyvinylchloride or polyvinylethylene, or is used after being saponified into polyvinylalcohol

POLYVINYLALCOHOL (PVAL)

A water soluble polymer prepared by essentially complete hydrolysis of polyvinylesters (e.g. polyvinylacetate)

POLYVINYLCHLORIDE (PVC)

A polymer prepared by polymerization of vinylchloride as the sole monomer

PORE

A single small cavity surronded partially or completely by walls

PORE, CLOSED

A pore totally enclosed by its walls and hence not interconnecting with other pores

PORE, OPEN

A pore not totally enclosed by its walls and hence interconnecting with other pores

POROSITY

1. The relative volume part of pores (either open, closed or both) in mass
2. The presence of numerous small cavities

PORISITY, CLOSED (DISCONTINUOUS)

The relative volume part of closed pores in a material

PORISITY, OPEN (CONTINUOUS)

The relative volume part of open pores in a material

POROUS (MATERIAL)

A genetic term for materials containing many pores (eighter open, closed, or both) dispersed throughout the mass

POWDER, REDISPERSABLE

Dry powder with the ability of dispersion when water is added

PREDRYING

The process of drying of hygroscopic compounding material by heating in order to remove the moisture contained

PREHEATING

The process of heating the material of thermosetting resin before it is processed for the purpose of improving working efficiency and the quality of a product

PREPOLYMER

A reactive oligomer of a degree of polyreaction between that of the monomer(s) and the final polymer obtained by stopping the polyreaction at an intermediate stage

PRESSURE, VAPOUR

The pressure exerted when a compound is in equilibrium with its own vapour at a given temperature

PRIMER

A compound which is precoated on the substrate to improve a bond or adhesion between a material (concrete, mortar etc.) and the substrate

PROCESSABILITY

The relative ease with which a compounded mix can be handler

PROPERTY, EXTENSIVE (ADDITIVE)

A property dependent on the mass of the system

PROPERTY, INTENSIVE

A property independent of the mass of the system

RADIATION, IONIZING

High energy, electromagnetic waves that activate initiators or create free-radicals directly from monomers by energy absorption

RATE, PERMEATION

The flow rate of gas (vapour) or liquid under specified continuous, through a prescribed area of a solid body, divided by the area

RATIO, POISSON'S

The ratio of transverse strain to the corresponding axial strain in an elastic straight rod when an axial load is applied

Note: The inverse value of Poisson's ratio is called Poisson's number

RECIPE

A formulation mixing procedure, and any other instructions needed for the preparation of a product

RECOVERY

The ability of stressed material to return totally or partially to its original state when external force that has caused the deformation is removed

REINFORCEMENT

1. The method of increasing the mechanical performance capability of a material by the incorporation of compounds that do not participate significantly in the hardening process
2. A solid element incorporated to the material (matrix) for increasing its mechanical performance capability

RELAXATION, STRESS

The decrease in stress after a given time at constant strain

REPELLENCY, WATER

The ability of a material to resist wetting by water

RESIN

A solid, semisolid or pseudosolid organic material of indefinite, often high molecular weight, which exhibits a tendency to flow when subjected to stress, usually has a softening or melting range, and usually fractures conchoidally

Note: In a broad sense the term is used to designate any polymer that is a basic material for plastics

RESIN, ALKID

An unsaturated polyester convertible into a cross-linked form, requiring a reactant of functionality higher than two, or having double bonds. Most frequently a resin made by condensing a polybasic acid and polyhydric alcohol (UP)

RESIN, CASTING

A liquid resin that can harden without application of pressure

RESIN, EPOXY (E)

Resin containing ether or hydroxyalkyl repeating units, or both, resulting from the ring-opening reactions of lower molecular weight polyfunctional oxirane resins, or compounds, with catalyst or with various polyfunctional acidic or basic coreactants

RESIN, FURAN (F)

A resin in which the furan ring is an integral part of the polymer chain and represents the greatest amount of mass, usually based on furfuryl alcohol

including resins, obtained by its polymerization or by condensation of furfuryl alcohol with furfurylaldehyd, formaldehyd, etc.

RESIN, POLYACRYLATE (ACRYLICS) (A)

A polymer based on acrylic esters and their structural derivates

RESIN, POLYMETHACRYLATE (PMA)

A polymer based on methacrylate esters

RESIN, POLYURETHANE (PU)

A polymer having urethane linkages in the molecular chains, being obtained by polyaddition of aliphatic diamines or that of an organic diisocyanate with compounds containing hydroxyl groups

Note: Polyurethanes may by thermosetting, thermoplastic, rigid or soft and flexible, cellular or solid

RESIN, SILICONE (SI)

Polymers in which the main chain consists of siliconoxygen bonds

RESIN, STYRENE-ACRONITRILE (SAN)

A copolymer based on acrylonitrile, styrene and its derivatives

RESIN, SYNTHETIC

A polymer substance produced by chemical synthesis, being the main material of plastics, coating material, adhesives, etc.

Note: It is classified mainly as themosetting resin and thermoplastics resin. A polymer material obtained from plants or animals is called a natural resin

RESIN, UNSATURATED POLYESTER (UP)

A polyester having unsaturated groups in the main chain dissolved in reactive monomer

RESISTANCE, ABRASION

The capacity of a material to resist wear and tear

RESISTANCE, COLD

The lower limit temperature at which the product can maintain flexibility

RESISTANCE, FIRE

The ability of a material to resist fire

RESISTANCE, FLAME

The ability of a material to resist burning

RESISTANCE, FREEZE-SALT

The ability of a material to withstand repeated frost actions when exposed to salt

RESISTANCE, FREEZE-THAW

The ability of a material to withstand repeated frost actions

RESISTANCE, FUNGUS

The resistance of a material to the erosion by breeding fungi

RESISTANCE, IMPACT

The resistance to fracture under shock force

RESISTANCE, LIGHT (LIGHT STABILITY)

The ability of a material to resist light

RESISTANCE, OIL

The ability of a material not to swell or to dissolve in oils, and to resist the demage in appearance or shape such as development of cracks, or deterioration of physical properties

RESISTANCE, SOLVENT

The ability of a material neither to swell nor to easily dissolve in solvents

RESISTANCE, THERMAL

The ability of a material to resist thermal action

RESISTANCE, WATER

1. The property of retarding both penetration and wetting by water
2. The ability of a material to maintain its original properties after being exposed to water

Note: All the abilities or properties should be established by standardized test methods

RESITE

A certain thermosetting resin in the final three-dimensional stage of the process of polycondensation, also called C-stage

RESITOL

A certain thermosetting resin in the intemediate state where the condensation reaction of resol has been advanced further but not to final

stage, also called B-stage

Note: The material swells when in contact with certain liquids and softens when heated, but may not entirely dissolve or fuse

RESOL

A certain thermosetting resin being the starch-syrup state condensate in the early stage of condensation reaction, also called A-stage

Note: The material is still soluble in certain liquids and may be liquid or capable of becoming liquid upon heating

RETENTION, WATER

The ability of a material to prevent internal water evaporation

SAMPLE

A small part or portion of a material or product intended to be representative of the whole

SAPONIFICATION

A chemical reaction in which ester is hydrolysed to form carboxylic acid and alcohol

SELF-EXTINGUISHING

A property of a plastic, burning on application of a flame and extinguishing by itself on removal of the flame

SELF-IGNITION

The minimum initial temperature at which a plastic is led to ignition, if its temperature is raised at a slow and uniform rate

SET

Strain remaining after complete release of the force producing the deformation

SHRINKAGE

Reduction of volume of a material due to the hardening, solidification or physical changes

SHRINKAGE, PRIMARY

Irreversible reduction of volume of a material due to the chemical hardening or melt solidification

SHRINKAGE, SECONDARY

Reversible reduction of volume of a material due to drying solidification, moisture evaporation, or other constituent evaporation

SOL

A colloid, the dispersing medium of which is a liquid, being the general term for suspension and emulsion
see PLASTISOL

SOLID (IN POLYMER), TOTAL

The weight ratio of the total amount of the polymer, emulsifier and other solid contained in a polymer dispersion, to the total amount of the polymer dispersion

SOLIDIFICATION

Change of a material from viscous (or liquid) state into solid state without chemical changes (e.g. cooling of thermoplastic melt)

SOLVENT

A substance (usually liquid) able to dissolve another substance (usually specified)

SPECIMEN

A piece of material sample appropriately shaped and prepared so that it is ready to use for a test

STABILIZER

1. A substance incorporated in a material to prevent its degradation or deterioration during its production or under its serving conditions
2. A substance incorporated in a material to prevent aggregation (coagulation) of dispersed particles and to impose the storage stability

STRAIN

1. Deformation developing in a body by a stress
   Note: The strain caused by an internal stress is called internal strain
2. The unit change, due to force, in the size or shape of a body referred to its original size or shape

STRAIN, TOTAL

The deformation of a body under loading

STRENGTH, ADHESIVE

The ahhesion value per area of bonding surface

STRENGTH, BONDING

The strength between two adjacent materials (bodies) connected together

STRENGTH, BURSTING

The hydraulic pressure required to produce rupture in the test piece, when it is continuously pressurized by a liquid or air

STRENGTH, COMPRESSIVE

The maximum compressive stress when a material is broken by a compressive load

STRENGTH, FLEXURAL (BENDING)

The stress at which breaking takes place by a bending load according to the theory of elasticity

STRENGTH, SHEAR

The maximum shear stress in a material at which it breaks under shearing load

STRENGTH, SPECIFIC

The ratio of the strength of a material to its specific gravity

STRENGTH, TEAR

When a notched test specimen or a specimen prepared to a special shape is pulled, the tear strength is expressed by the quotient of the maximum stress during the teating of the test specimen, divided by its original thickness

STRENGTH, TENSILE

The maximum stress during the stage until the material breaks by a tensile load, implying the quotient of the maximum load divided by the original cross-sectional area of the test piece

STRESS, FIRST ORDER

The stress in a homogeneous body

STRESS, INNER

The stress produced in a material from causes other than an external force (e.g. temperature changes, shrinkage)

STRESS, SECOND ORDER

The stress in a body consisting of homogeneous particles

STRESS, THIRD ORDER

The stress in a structure of particles (crystalline grains)

STRUCTURE

The spatial configuration of physical elements connected by mutual bonds (brinking certain physical properties)

SUBSTRATE

A material on which another material is placed and should adhere or be infiltrated

SUBSTRUCTURE

Structure of (agglomerates or) single particles of the dispersed phase

SUPERSTRUCTURE

Structure of composite materials as a whole

SURFACE, FREE INNER

The surface of the whole area among solid phase(s) and fluid phase(s) in a structural system

SURFACE, INNER

The sum of the surface areas of all the particles of the dispersed phase (solid or liquid)

SURFACTANT

A surface active compound in which one portion of each molecule is hydrophilic (water-miscible) and another portion is lipophilic (oil-miscible) or hydrophobic (water immiscible)
see EMULSIFIER

SUSPENSION

A system in which solid particles are dispersed in a liquid in corpuscles as fine as visible by the naked eye or through a microscope

SWELLING

Increase in volume of a solid immersed in a liquid or exposed to vapour, caused by absorption of a liquid without any change in arrangement of structure

SYNERGISM

Co-operative simultaneous action of discrete components such that their total effect is greater than the sum of individual effects

SYSTEM

A set of physical bodies which as a whole is separated from the rest of the world forming the ambient environment

SYSTEM, AGGREGATED

A system of particles in a composite where the transmission of loading from one grain to another is directed predominantly through compressive or tensile stresses

see SYSTEM, SEGREGATED

SYSTEM, COALESCENT

Compact agglomerated system

SYSTEM, COMPACT (BULK)

A structural material in which solid components fully fill a given volume (resulting in a poreless body)

SYSTEM, COMPOSITE

A solid product consisting of two or more layers (often in symmetrical assembly) of plastics film or sheet, normal or cellular plastics, metal, wood, composite (according to deffinition),etc., with or without adhesive interlayers,which attains properties (or a group of properties) not attainable by any compound (layer) either singly or by simple summation of them

SYSTEM, CONJUGATED STRUCTURAL

A structural material remaining solid due to the influence of strong physical and/or chemical interface bonds among phases even if outer loading takes place

SYSTEM, DISCONTINUOUSLY POROUS

A system with closed porosity (with a close inner volume of the fluid phase)

SYSTEM, DISJUGATED STRUCTURAL

A structural material having limited coherence only due to weakness of physical and absence of chemical interface bonds among phases

SYSTEM, FIELD POLYMER IMPREGNATION

A partial impregnation system in which new or old concrete (mortar) is impregnated in the site

SYSTEM, GRANULAR

A conjugated or disjugated structural system with granular particles

SYSTEM, MACRODISPERSION

A structural system in which the dispersed particles are mostly observable by the naked eye

SYSTEM, MICROSTRUCTURAL

A system in which the decisive influence is exercised by stresses of the 2nd and 3rd order

SYSTEM, PARTICULAR

A conjugated or disjugated structural system with particles of different forms and dimensions

SYSTEM, SEGREGATED

A system of particles in a composite, which are not in mutual force contact

SYSTEM, STRUCTURAL

A system in which the decisive influence is exercised by stress of the first order

SYSTEM, SUPERMONOSTRUCTURAL

A superstructural system formed by constituents of identical structure

SYSTEM, SUPERMULTISTRUCTURAL

A superstructural system formed by constituents of several structures

TEMPERATURE, BRITTLE(NESS)

The upper limit of temperature at which the test specimen of a material has brittle fracture in a low temperature impact test

TEMPERATURE (UNDER LOAD), DEFLECTION

The temperature at which a test piece shows a specific deformation under a specific load, used as a standard for initiating the heat resistance of a composite

TEMPERATURE, MINIMUM FILM FORMATION

The minimum temperature at which coherent film can be formed from polymer dispersion

TEST, DYNAMIC

A test in which load or deforming speed varies. It includes fatigue test, impact test, etc.

TEST, THERMAL (SHOCK)

The test for examining the variation of a material resulting from rapid heating and cooling

TEXTURE

Representation (specification) of the character (regularity) of structure manifesting itself in a certain orientation or other regularity used usually for external surface

THERMOPLASTIC

Linear or branched polymers which can be softened and take on new shapes by application of heat and pressure only. They can be repeatedly reshaped as no chemical changes are involved in the process.

THERMOSET (REACTOPLAST)

Cross-linked polymer originating by chemical reaction in the case that the functionality of at least one monomer is higher than 2, not fusible by heat

THERMOSETTING

Capable of being changed into a substantially infusible or insoluble product when cured by heat or other means

THIXOTROPY

The property of a material that enables it to stiffen in a short period of standing, but to acquire a flowability on mechanical agitation, shaking, etc., the process being reversible

TIME, CURE

The period of time that a reacting thermosetting material is exposed to specific conditions to reach a specified property level

TIME, GEL

The time from the initial mixing of the reactants of a liquid material (monomer or resin) composition to the time when gelation starts

Note: For a material that must be processed by exposure to some form of energy, the initial time is the start exposure

TOUGHNESS

Energy required to break a material which is equal to the area under the stress-strain curve

TRANSITION (Tg), GLASS

The temperature at which the polymeric material undergoes a change from a melt or rubbery state to a glassy,hard and brittle state. This transition is associated with the cessation of local molecular motion

Note: 1. The observed temperature can vary significantly depending on the specific property chosen for observation and on details

of the experimental technique. Therefore, the observed Tg should be considered only an estimate

2. The midpoint of the temperature range over which this transition takes place is commonly termed the GLASS TRANSITION TEMPERATURE or GLASS TRANSITION POINT. After reaching it, the thermal change rates of physical properties change discontinuously.

TRANSITION, FIRST-ORDER

A reversible change in the phase state of a material, in the case of polymers-crystallization and melting. This transition is usually sharp and associated with a discontinuous change in a function, such as volume or enthalpy.

Note: The midpoint of the temperature range over which transition takes place is commonly termed as FIRST-ORDER TRANSITION TEMPERATURE

TRANSITION, SECOND-ORDER

A reversible, but continuous, change of a function, like volume. The glass-transition is a second order transition involving only a change in the temperature coefficient of the specific volume

UNSATURATION, DEGREE OF (RATE OF)

Number of binary bonds occurring in one monomer molecule

Note: If the degree of unsaturation of all monomers equals 1, the chaining is linear and a thermoplastic polymer originates. If at least one monomer has the degree of unsaturation in excess of 1, a thermosetting polymer originates.

VALUE, ACID

The free acid content in a resin, plasticizer, solvent, or else, expressed by the number of milligrams of potassium hydroxide required to neutralize the free acid contained in 1 kg of the material

VALUE, ADHESION

The force required to cause a separation at the interface of two bonded (adhered) surfaces or components

VALUE, IMPACT

A value representing the resistance of a material to impact, generally expressed by the quotient of the energy required to break a test piece by an impact bending load divided by the cross-sectional area or width of the test piece

VALUE, INTERFACE

The magnitude of inner surface of individual phases, most frequently the surface of all particles of the dispersed phase or/and of all pores

VISCOELASTICITY

Any combination of viscous and elastic behaviour

VISCOSITY

The resistance of a material to flow under stress, expressed by the ratio of a shearing force exerted on the material to the shearing strain speed (Pa.s)

Note: 1. The viscosity varies with the shearing stress for non-Newtonian fluids (e.g.plastics). Therefore, the viscosity at a specific stress is called the APPARENT VISCOSITY

2. The quotient of the viscosity divided by the density of the fluid is the KINEMATIC VISCOSITY (m^2s^{-1})

VOID

In a solid material, an unfilled space of such size that it scatters radiant energy such as light

see PORE, CELLS

VOLUME, CRITICAL MATRIX

The amount of matrix (binder) needed to envelop all the particles in the aggregated system

Note: The decrease of matrix volume under this limit causes existence of disjugated agglomerates of conjugated particles in the aggregated system and the system turns into a non-cohesive system

VOLUME, FICTIVE MATRIX

The real matrix volume lessened by the volume firmly bonded to the surface of particles, which is taken as their physical part

VOLUME, REAL

The volume of binder (matrix) put into the system

VOLUME, REPRESENTATIVE

The minimum volume of the system which is large enough with respect to the present heterogeneities to be considered as a homogeneous material

WARP (WARPAGE)

Concave or convex distortion of mainly flat members by the strain after placing and hardening. A dish-like deformation is called a DISHING and the opposite a DOMING

WATERPROOFNESS

The ability of a material to maintain its original properties while exposed to water

WATERTIGHTNESS

The ability of a material to resist penetration of water
see WATERPROOFNESS

WEAR

The comulative action of all the deleterious mechanical influences encountered in use that tend to impair a material's serviceability

WEATHERING

Deterioration of a material during outdoor exposure

WEATHERING, ARTIFICIAL

Exposure to laboratory (usually intensified) conditions which may be cyclic, involving changes in temperature, relative humidity, radiant energy, and any other elements found in the atmosphere in various geographical areas

WEIGHT, UNIT

The weight of representative volume equal the specific weight or density of composite

WICKING

Transmission of gas or liquid due to a pressure differential or capillary action, along fibers incorporated in a product

WORKABILITY

The ability of a fresh mix to be worked and moulded into desired form