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Standard Terminology Relating to Manufactured Carbon and Graphite[1]

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across grain, *n*—Synonym for against grain.

against grain, *n—in manufactured carbon and graphite product technology*, the direction in a carbon or graphite body with preferred orientation that has the maximum c-axis alignment (syn. *across grain*).

agglomerate, *n— in manufactured carbon and graphite product technology*, a composite particle containing a number of grains.

ash, *n—in carbon and graphite technology*, the residue remaining after oxidation of a carbon or graphite.

binder—a substance, usually an organic material such as coal tar pitch or petroleum pitch, used to bond the coke or other filler material prior to baking.

carbon—an element, number 6 of the periodic table of elements, electronic ground state $1s^2 2s^2 2p^2$.

carbon—*in carbon and graphite technology*, an artifact consisting predominantly of the element carbon and possessing limited long range order.

DISCUSSION—The presence of limited long range order is usually associated with low electrical and thermal conductivity and difficult machinability when compared with graphite.

coarse-grained—containing predominately large grains that are greater than 0.1 mm in size.

coke—a carbonaceous solid produced from coal, petroleum, or other materials by thermal decomposition with passage through a plastic state.

compressive strength—a property of solid material that indicates its ability to withstand a uniaxial compressive load.

defect—*of a manufactured carbon or graphite product*, any irregularity in the chemistry, microstructure, or macrostructure.

defective—having flaws or dimensional deviations greater than acceptable for the intended use.

electrographite, *n— in carbon and graphite technology*, a synonym for manufactured graphite.

extruded—formed by being forced through a shaping orifice as a continuous body.

filler—*in manufactured carbon and graphite product technology*, carbonaceous particles comprising the base aggregate in an unbaked green-mix formulation.

fine-grained—containing predominately small grains that are less than 0.1 mm in size.

flaw—a defect sufficiently greater than those typical of the morphology of a carbon or graphite body to influence a property.

flexural strength—a property of solid material that indicates its ability to withstand a flexural or transverse load.

flow line—a defect induced by discontinuous flow velocities during forming of molded or extruded bodies.

grade—the designation given a material by a manufacturer such that it is always reproduced to the same specifications established by the manufacturer.

grain, *n—in manufactured carbon and graphite product technology*, a region in a carbon or graphite body that is identifiable as being derived from a particle of filler.

graphite—an allotropic crystalline form of the element carbon, occurring as a mineral, commonly consisting of a hexagonal array of carbon atoms (space group P 6_3/mmc) but also known in a rhombohedral form (space group R 3m).

graphite—*in carbon and graphite technology*, an artifact consisting predominantly of the element carbon and possessing extensive long range order.

DISCUSSION—The presence of extensive long range order is usually associated with high electrical and thermal conductivity in the hexagonal plane and relatively easy machinability when compared with carbon.

green carbon—a formed, but unfired carbon body.

hardness—the resistance of a material to deformation, particularly permanent deformation, indentation, or scratching.

impervious graphite—manufactured graphite that has been impregnated with a resinous material to make the final article impervious to liquids in the recommended operating range.

impervious carbon—the same as impervious graphite with the exception that the base stock has not been graphitized.

impregnation—partial filling of the open pore structure with another material.

lamination—line of demarcation or elongated void generally parallel to the principal grain direction of a carbon or graphite body.

longitudinal sonic pulse—a sonic pulse in which the displacements are in the direction of propagation of the pulse.

machinability—a measure of the ease with which a material can be shaped with the aid of cutting or abrasive tools.

[1] This terminology is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.F on Manufactured Carbon and Graphite Products.

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manufactured carbon—a bonded granular carbon body whose matrix has been subjected to a temperature typically between 900 and 2400°C.

manufactured graphite—a bonded granular carbon body whose matrix has been subjected to a temperature typically in excess of 2400°C and whose matrix is thermally stable below that temperature.

molded—formed in a closed die by the application of external pressure.

orientation of a crystal—the angular position of a crystal described by the angles which certain crystallographic axes make with the frame of reference.

orientation of a grain—the angular position of a grain described by the angles which a defined set of axes of the grain make with the frame of reference.

orientation of an object—the angular position of an object described by the angles which a defined set of axes or surfaces of the object make with the frame of reference.

oxidation of carbon—the chemical combination of carbon with oxygen or oxygen-containing compounds.

particle sizing—segregation of granular material into specified particle size ranges.

penetration—the depths to which one material extends into or penetrates another.

permeability—a property measured by the rate of passage of a fluid under a pressure gradient through a material.

porosity—the percentage of the total volume of a material occupied by both open and closed pores.

preferred orientation— *in manufactured carbon and graphite product technology*, an alignment in the crystal or defect structure of a body leading to variations in physical properties as a function of direction; normally referenced to an orthogonal system where one of the axes is the working direction.

pulse travel time (T_t)—the total time, measured in seconds, required for the sonic pulse to traverse the specimen being tested, and for the associated electronic signals to reverse the circuits of the pulse-propogation circuitry.

reactivity—rate at which another material will form compounds with carbon or graphite.

surface finish—the geometric irregularities in the surface of a solid material. Measurement of surface finish shall not include inherent structural irregularities unless these are the characteristics being measured.

tensile strength—a property of solid material that indicates its ability to withstand a uniaxial tensile load.

ultimate tensile strength—the highest load attained during a tensile test, converted to unit stress based on the original cross-section area of the tensile test specimen.

void—an unfilled space enclosed within an apparently solid carbon or graphite body.

with grain, *n*—*in manufactured carbon and graphite product technology*, the direction in a carbon or graphite body with preferred orientation that has the maximum a-axis alignment.

working direction—*in manufactured carbon and graphite product technology*, direction of applied force used in forming a solid body; generally the direction of applied molding pressure for a uniaxially molded material and the extrusion direction for an extruded material.

zero time (T_o)—the travel time (correction factor), measured in seconds, associated with the electronic circuits in the pulse propagation system.