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Standard Terminology of Powder Metallurgy¹

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1. Scope

1.1 This terminology standard includes definitions that are helpful in the interpretation and application of powder metallurgy terms.

2. Referenced Documents

2.1 *ASTM Standards:*

B331 Test Method for Compressibility of Metal Powders in Uniaxial Compaction

3. Terminology

3.1 *Definitions:*

acicular powder, *n*—needle-shaped particles.

activated sintering, *v*—a sintering process during which the rate of sintering is increased, for example, by addition of a substance to the powder or by changing sintering conditions.

agglomerate, *n*—several particles adhering together.

air classification, *n*—the separation of powder into particle size fractions by means of an air stream of controlled velocity.

angle of repose, *n*—the basal angle of a pile formed by powder when freely poured under specified conditions onto a horizontal surface.

apparent density, *n*—the mass of a unit volume of powder, usually expressed as grams per cubic centimetre, determined by a specified method.

apparent hardness, *n*—the hardness of a PM material (including the effects of porosity), measured using macroindentation hardness equipment.

DISCUSSION—See general description of production, properties, and uses of sintered metal powder bearings and structural parts, paragraph

on density and mechanical properties, information on hardness measurement, Volume 02.05.²

apparent porosity, *n*—specific to cemented carbides, microstructural features that appear to be pores in a properly prepared, unetched surface; these features may result from uncombined carbon or nonmetallic inclusions as well as actual porosity.

atomization, *n*—the dispersion of a molten metal into particles by a rapidly moving gas or liquid stream or by mechanical means.

atomized metal powder, *n*—metal powder produced by the dispersion of a molten metal by a rapidly moving gas, or liquid stream, or by mechanical dispersion

blank, *n*—a pressed, presintered, or fully sintered compact, usually in the unfinished condition, requiring cutting, machining, or some other operation to give it its final shape.

blending, *n*—the thorough intermingling of powders of the same nominal composition (not to be confused with mixing).

blister crack, *n*—typically small defects (star burst) over or around a bump or blister.

DISCUSSION—These may occur during sintering as a result of rapid outgassing of the lubricant. The rapid outgassing may be caused by the specified amount of lubricant being subjected to an excessive heating rate. The defects may also be caused by “concentrated balls” of lubricant, or moisture. During the sintering of the copper base PM parts, hydrogen gas from the furnace atmosphere can diffuse into the compact and react with residual oxygen, producing steam that can form blisters and cracks. In that industry, this is also called embrittlement, and is not to be confused with the hydrogen embrittlement of high strength steel.

blistered compact, *n*—a sintered object characterized by having blisters or eruptions on the surface.

DISCUSSION—In ferrous materials, this effect is often caused by *in situ* gas decomposition and soot formation that forces particles apart and causes the compact to blister.

¹ This terminology is under the jurisdiction of ASTM Committee B09 on Metal Powders and Metal Powder Products and is the direct responsibility of Subcommittee B09.01 on Nomenclature and Technical Data.

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² For a discussion of apparent hardness, see the section on Density in General Description of Production, Properties, and Uses of Sintered Metal Powder Bearings and Structural Parts, which appears in the *Annual Book of ASTM Standards*, Vol 02.05.