

*Disks and Substrates*Document No. D18-96
Page 1 of 9**GLOSSARY OF DISK/SUBSTRATE TERMS****PURPOSE**

The purpose of this glossary is to create common usage and understanding among disk and substrate uses and interested groups. This glossary is also useful for training persons entering the disk drive industry.

SCOPE

The scope of this glossary is limited to disks and substrates.

REFERENCED STANDARDS

IDEMA D2-91, Specification for Substrates for Rigid Disks.

DEFINITIONS

-A-

1. **ADHERED GLASS** - Small transparent glass particles adhered or fused to the glass surface.
2. **AIRLINE (Glass)** - An elongated gaseous inclusion.
3. **ALLOY** - Name given to metal mixtures composed of several elements. Aluminum alloys use a system of four digits to identify particular compositions, the first digit indicates the alloy group, 5xxx indicates a magnesium bearing aluminum alloy, 6xxx indicates a magnesium and silicon aluminum alloy.
4. **AMP-TURNS** - Used in the interface process of controlling the coupling of magnetic field to or from a magnetic layer relative to the recording head signal output.

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5. **BLISTER (Glass)** - A bubble in glass greater than .030" in length. A gaseous inclusion. May be open at surface.
6. **BOW** - The measure of curvature relative to a perfectly flat disk. MILS or MICROINCHES per linear distance are its units.
7. **BOW (Glass)** - A term more properly applied to glass tubing; for sheet glass see Warp.
8. **BREAK-THROUGH** - The physical void of material between two holes or adjacent voids.

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9. **CAMBER (Glass)** - A slight convex curve of a surface; for sheet glass see Warp.
10. **CHECK** - A fissure in the glass which does not extend through the thickness of the material.
11. **CHIP** - Region of material missing from the surface or edge of a substrate material. This defect does not pass through both sides. See — INDENT.
12. **CHIP (Glass)** - A depression or irregularity on the surface caused by the unintentional removal of glass (as in flaking).
13. **CIRCUMFERENTIAL** - Points of reference which are equidistant from an axis of rotation.
14. **CIRCUMFERENTIAL LINES** - Visual circular lines (scratches) on the surface of the substrate after the final finish.
15. **CLEANLINESS** - A term used to describe the degree of particulate contamination or foreign material allowable on a part or laboratory environment.
16. **COMET** - The visual pattern created by thickness variations in an epoxy media spun on a disk. This pattern occurs if the surface is not perfectly smooth or if a particle of solid material rest on the surface during spinning.
17. **CONCAVE** - Surface area which has a depression relative to the immediate surrounding area. (ID depressed with respect to OD).
18. **CONVEX** - The opposite of concave, having a protrusion relative to the surrounding area. (ID protruding with respect to OD).
19. **CORD** - A narrow inhomogeneous band of glass having a different refractive index than the surrounding glass.
20. **CORROSION** - Destructive chemical deterioration of a metal by reaction with its environment. Corrosion in disks occurs at thin film interfaces (substrate to thin film, thin film to thin film or thin film to environment).
21. **CRACK** - A fissure in the glass extending through both surfaces and body of the material.
22. **CRUSH (Glass)** - A lightly pitted area resulting in a gray appearance, usually the result of the abrasive action of a glass chip between two sheets of glass.

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23. **CUT-OFF** - The term given the length of a sinewave whose amplitude is transmitted with 75% of its actual height. The selection of a cut-off length determines which feature of the profile is regarded as roughness and therefore constitutes thoroughness profile.

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24. **DEFECT, PROTRUDING** - Asperities, particles, contamination, or foreign debris above the surface of substrates.
25. **DEVITRIFICATION** - The process by which glass returns to its non-glassy state. The glass is said to have "devitrified."
26. **DIAMOND TURNED** - Micromachining operation using a diamond cutting tool to obtain a microscopic finish.
27. **DIGS** - Pulled out surface micro-structure caused by burnishing, polishing or other process machining.
28. **DINGS** - Marks left on disk surface due to physical mishandling.
29. **DIRT** (Glass) - Foreign material which contaminates the glass surface.
30. **DOUBLE DISK GRIND** - The process of surface polishing a substrate using two polishing wheels counter rotating.
31. **DRAW LINES** - A surface irregularity or waviness caused during glass fabrication.
32. **DUB-OFF** - A lesser degree of chamfer, slight rounding of the intersection of two surfaces.

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33. **EDGE-BREAK** - The physical deformation which occurs at the edge area when material is cut, sheered and punched. The edge usually has a raised deformation.
34. **ELECTROLYTE** - A solution that will conduct an electric current. Chemically a compound whose water solution will conduct an electric current. Acids, bases, and salts are electrolytes.
35. **ELECTROLYTIC** - Chemical action of or having to do with an electrolyte.

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36. EPOXY COATING - Pertains to the magnetic layer spun on top of a substrate. Epoxy coating describes the polymeric material in which the magnetic particles and alumina are suspended.

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37. FLARE (Glass) - Cutting fin or projection on a score cut edge.

38. FLAT BAKE - The process of clamping a stack of substrates between two massive rigid plates under extreme pressure then subjecting the assembly to an elevated temperature. The assembly is allowed to cool slowly to stress relieve the disks and flatten them after rough machining.

39. FLY-CUT - Machinist term of process used to cut the substrate blanks to rough dimension.

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40. GASEOUS INCLUSION - Void in the body of the glass as a result air or reaction gases from the melt becoming trapped in the solidifying glass.

41. GAUSS - The unit of magnetic induction or magnetic flux density in the SI system — equivalent to one maxwell per square centimeter. NOTE: The earth's magnetic field is approximately 0.3 to 0.5 gauss

-H-

42. HARDNESS - The resistance to plastic deformation of a locally stressed substance. The hardness of metals is called out as BRINELL or a ROCKWELL hardness number representing different measurement methods by permanent impression in the material made by an indenter. Higher numbers represent higher resistance of the surface to indentation by inference to wear or abrasion.

43. HAZE - The cloudy aspect of a particulate coating or thin film as opposed to a glossy appearance.

44. HAZE (Glass) - A smoky or cloudy film on the surface of the glass, may be either washable or permanent haze.

45. HEAT TREATMENT - The process of raising metal to a high temperature then cooling in a controlled profile. This process will give a known physical property and stabilize the structure.

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- 46. INCLUSION** - A small solid body or a gaseous or liquid substance contained in a crystal or a mineral mass.
- 47. INTERDIFFUSION** - Microscopic intermixing of thin film materials with one another occurring at the boundaries of the films.
- 48. INTERMETALLICS** - Intermediate crystal structures occurring in alloys.
- 49. IRON OXIDE** - The most common magnetic constituent of a particulate magnetic coating.

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- 50. KNOT (Glass)** - An embedded glassy transparent lump having an irregular or tangled appearance. Its size shall be determined by the size of the distorted area.

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- 51. LOOSE GLASS (Glass)** - Small glass particles which cling to the main surface of the glass by electrostatic charge or moisture, and can be physically removed without surface damage.

-M-

- 52. MEDIA, ELECTROLESS** - Magnetic media deposited by immersion in a chemical bath without recourse to an external electrical source.
- 53. MEDIA, ELECTRON-BEAM EVAPORATION** - Magnetic layer deposited by vacuum process in which an electron-beam is used as a heat source to evaporate the magnetic material.
- 54. MEDIA, ELECTROPLATED** - Magnetic layer deposited by immersion in a chemical bath using the passage of electric current to transport the metallic ions.
- 55. MEDIA, EVAPORATED** - Magnetic layer deposited by a process in which the magnetic layer is evaporated in a vacuum chamber. The metallic vapor condenses on the disk to form the thin magnetic film.
- 56. MEDIA, PHYSICAL DEPOSITION** - Magnetic layer deposited by a vacuum process such as sputtering or ion beam i.e. involving ionic or molecular bombardment in a plasma.

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57. **MEDIA, THERMAL EVAPORATION** - Magnetic layer deposited by vacuum process in which the metal to be deposited is heated to the evaporation point by a filament carrying a heavy current, by r.f. induction or by electron bombardment.

58. **MEDIA, VAPOR DEPOSITION** - Magnetic layer deposited by a vacuum process where the magnetic material is thermally evaporated than condensed on the surface of a disk. See media evaporated.

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59. **NODULE** - Small aggregates or clusters of material protruding from the surface.

60. **NON-MAGNETIC NICKEL** - A sub-layer applied between a substrate and a magnetic thin film.

-O-

61. **OPEN GASEOUS INCLUSION (Glass)** - A gaseous inclusion which so near the surface that it is obviously "open" and/or one so close to the surface that it may be broken open with the point of a soft lead pencil.

62. **ORANGE PEEL** - Refers to the appearance of an epoxy coated disk with small irregularities in coating thickness resembling, an orange peel texture.

63. **ORIENTATION** - A term used to describe the process of aligning the magnetic particles of a particulate media in a specific direction. This is done by applying a strong magnetic field to the revolving disk before hardening the epoxy binder to its final setting.

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64. **PATTERNING** - Visual effect or reflection of surface texture when light is used to inspect disk for surface flaws. EXAMPLE - Particulate media greenish bands due to orientation.

65. **PIT** - A particle of glass having been removed from the glass surface unintentionally.

66. **POROSITY** - The property of a substance whose atomic structure allows microscopic voids to exist.

67. **PULL-OUTS** - The removal of weakly bound microscopic agglomerates of material occurring in a lapping or polishing operation.

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- 68. RELUCTANCE** - The resistance offered to the passage of magnetic lines of force. It is equivalent to the ratio of the magnetomotive force to the magnetic flux.
- 69. RIPPLES** - Periodic thickness variations in a coating.
- 70. ROLLER MARK or ROLLER PRINT** - A deviation or deformation in thickness caused by excessive pressure or a squeezing action on the substrate material.
- 71. ROLLER SCUFF (Glass)** - A marring or abrasion of the surface, a series of small fine scratches caused by detrimental roller contact.
- 72. ROUNDNESS** - Describes the transition between a substrate's surface and edge at either the ID or OD. Also used to describe the circularity of the ID and OD diameters.
- 73. RUB (Glass)** - (Also see Roller Scuff, Scratch and Scuff). A surface scratch or series of small scratches generally caused in handling.
- 74. RUB-OFF** - Pertains to the chamfered area used mainly to describe the mechanical method of relieving an edge deburring).

-S-

- 75. SCALE** - Particles of carbon or metallic substances adhered to or embedded in the glass, usually red or black.
- 76. SCHLIEREN** - Disk flatness testing technique displaying pseudo interferometric colors.
- 77. SCUFF (Glass)** - The marring of the glass surface leaving a milky white, grayish, or matte appearance and having appreciable width as opposed to a scratch.
- 78. SCRATCH** - A single linear abrasion of the glass surface which may be of any length, width or direction.
- 79. SEED (Glass)** - An elongated bubble less than .030" length. A gaseous inclusion.
- 80. SEGMENT** - A wedge-shaped portion of a disk's surface, referred to in error testing.
- 81. SHEET** - Refers to raw stock for the substrate blanks before processing.
- 82. SHELL** - A depression or irregularity on the glass surface.
- 83. SIGNAL AMPLITUDE** - The measurement of magnetic flux reversals coupled through the read heads controlled by their amp-turns of pickup coil. Note — Amplitude is maximum at OD and minimum at ID. Amplitude increases as magnetic layer gets thicker and head flies closer to disk.

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- 84. SIZING** - The machining operation on a blank substrate which assigns accurate dimensions to the inner and outer diameter.
- 85. SKI JUMP** - That area of disk where the average surface height increases followed by a sharp This depression area at the OD during plating will cause excessive buildup resulting in a ski jump effect when heads fly over area.
- 86. SLEEK** - A very fine surface abrasion or hairline scratch.
- 87. SLURRY** - 1. A process of manufacturing disk coating which uses a chemical compound or mixture and the disk is spun up depositing a magnetic layer. This method is subject to variations of thickness. TOP COATING uses 1. A mixture of insoluble fine material in suspension in an aqueous or chemical carrier solution. 2. A compound consisting of a selected polishing material (i.e. diamond dust, alumina, etc.) suspended in a viscous liquid form.
- 88. SPUTTERING** - The process of depositing a target material on the surface of a disk, via discharge of plasma.
- 89. STAIN (Glass)** - Any erosion of the glass surface, cloudy in appearance, sometimes exhibiting apparent color.
- 90. STONE (Glass)** - Opaque or partially melted particles of rock, clay or batch material embedded in the glass.
- 91. STONE GRIND** - A method of material removal to achieve desired flatness and thickness dimensions of a substrate.
- 92. STREAK** - Surface distortion or irregularity, visible when illuminated from a point light source, may also be related to thickness variation.
- 93. STRESS RELIEVING** - The reduction of the effects of internal residual stresses in substrate blanks.lanks.

-T-

- 94. TAPER (Glass)** - Thickness deviation measured in the direction of drawing sheet glass. This is a total thickness deviation measured over the entire length of the sheet in question. (See wedge for total thickness deviation across the direction of drawing.) (See Figure 1.)
- 95. TEAR-OUTS** - Microscopic removal of base material either substrate or magnetic layer.
- 96. TEMPER** - Physical property of metal grain structure obtained by subjecting the alloy to specific sequence of basic treatments. The sequence of letters and digits following an aluminum alloy designation specify the temper.

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97. **THERMAL EXPANSION** - The effect of dimensional changes caused by temperature variations. Each material has its own characteristic coefficient of expansion.
98. **THICKNESS DEVIATION, LONG TERM (Glass)** - Variation in thickness across a sheet of glass that does not change slope relative to location across the sheet. This long term thickness deviation is also called Wedge or Taper, depending upon direction of measurement.
99. **THICKNESS DEVIATION, SHORT TERM (Glass)** - Variation in thickness across a sheet of glass that changes slope direction or rate relative to location across the sheet.
100. **THICKNESS DEVIATION, TOTAL (Glass)** - Maximum thickness minus minimum thickness, within a sheet of glass that changes slope direction or rate relative to location across the sheet.

-W-

101. **WARP** - A large surface irregularity; any deviation from a true plane.
102. **WEDGE (Glass)** - Departure of the opposite surfaces from parallelism; usually measured in minutes or seconds of arc or in interference fringes per inch. Thickness deviation measured across the direction of drawing sheet glass. This is a total thickness deviation measured over the entire width of the sheet in question. (See taper for total thickness deviation in the direction of drawing.)

-Y-

103. **YIELD STRENGTH** - The stress applied to a material which will cause a specific permanent deformation.