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Standard Terminology Relating to Thermal Imaging Products[1]

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1. Referenced Documents

1.1 *ASTM Standards:*[2]

F1405 Test Method for Determining the Dynamic Thermal Response of Direct Thermal Imaging Products—Atlantek Method

F1444 Test Method for Determining Dynamic Thermal Response of Direct Thermal Paper-Label Printer Method

F1445 Test Method for Determining Static Thermal Sensitivity of Direct Thermal Media

2. Terminology

activation temperature—temperature which generates an optical density of 0.20.

active coat, *n*—a coating layer which contains the primary image (color) forming ingredients.

*antioxidant***—**see **stabilizer**.

antistat—a chemical additive, generally added to the back side or printhead side of thermal products, which enhances the conductivity of the coating, allowing static electric charges to be bled off during the production processes or during the operation of the product in a machine.

background, *n*—a measure of the reflectance or density of the unimaged portion of a thermal paper; typically measured using a densitometer, reflectometer, or opacimeter.

basecoat, *n*—a coating applied to a base substrate to produce a level surface for the application of the active coat; may also function to improve the heat/energy transfer of the active coat layer.

binder, *n*—a material employed to bind the image-forming materials to the substrate.

DISCUSSION—Commonly employed materials include polyvinyl acetate, polyvinyl alcohol, starch, and styrene butadiene polymer dispersions.

*color former***—**see **leuco dye**.

core, *n*—a paper, plastic, or fiber core upon which the thermal product is wound.

developer, *n*—acidic materials which react with leuco dyes to form color.

DISCUSSION—Typical developers include Bisphenol A, TGSA, D8, and benzyl paraben.

direct thermal imaging product—paper, film, or other substrate upon which a coating is applied; the imaging components consist of a color former, a developer, a sensitizer and antioxidants which react to form an image when heated from a thermal printhead.

direct thermal paper, *n*—paper coated with a heat-reactive coating, which changes from a colorless form to an intense colored state upon contact with a thermal printhead.

direct thermal product, *n*—substrate coated with a heat-sensitive formulation for the purpose of creating an image when heat is applied from a thermal printhead.

D2T2, *n*—abbreviation for **dye diffusion thermal transfer**.

dye sublimination, *n*—an imaging process from thermal dye ribbons, which employ selected organic dyes, and have characteristics different from an imaging process using pigmented materials employed in thermal transfer wax ribbons.

dynamic thermal response curve, *n*—graphical representation of the response characteristic of a thermal printing system over a given range of print energies; the *y*-axis is optical density and the *x*-axis is print energy (watts/dot or millijoules) or energy density (millijoules/square millimetres). **(F1444, F05)**

environmental resistance, *n*—a measure of a direct thermal product's ability to resist the effects of exposure to environmental contaminants on either the imaged or unimaged areas.

DISCUSSION—Typical contaminants may include water, oils, alcohol, light, or heat/humidity.

[1] This terminology is under the jurisdiction of ASTM Committee F05 on Business Imaging Products and is the direct responsibility of Subcommittee F05.01 on Nomenclature and Definitions.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

image density, *n*—a measure of the reflectance or density of the imaged portion of a thermal imaging product after exposure to heat energy; typically measured with a densitometer, reflectometer, or opacimeter.

initial temperature—See **activation temperature**.

ink layer—(*1*) the components of the image coating used in thermal transfer products which contain waxes, resins, pigments and other materials deposited or coated onto a substrate; (*2*) the layer of thermally sensitive material which is transferred during the thermal transfer printing process.

ion content, *n*—a measure of the free sodium, potassium, and chloride content in a direct thermal or thermal transfer product; trace amounts may cause chemical attack to the thermal printhead elements.

leuco dye, *n*—color precursors, examples of which are triphenyl methane and fluoran classes which react with a developer to form a colored image.

DISCUSSION—Typical dyes include ODB 1, ODB 2, S-205, S-305, PSD 150, CF-51, and CVL.

onset temperature, *n*—in a thermal transfer ribbon, the temperature at which the imaging material begins to change physical form (that is, start to melt).

optimum energy, *n*—energy (millijoules/square millimetres) which achieves the best optical print density and consistent, well-defined image; dependent on ribbon thickness, coating formulation, ribbon speed in the printer, and print head temperature.

peak melting point, *n*—in a thermal transfer ribbon, the maximum temperature to which the imaging material should be subjected.

*precoat***—**see **basecoat**.

print speed rating, *n*—highest speed of image development under fixed operating conditions to obtain optimum print quality.

print speed response, *n*—the response curve of optical density versus print speed with a fixed energy level input.

receptor, *n*—the material which receives on its surface an image from a thermal printing process.

saturation density, *n*—the optical density value at which no additional density increase is seen on the thermal image as the energy delivered to thermal paper is increased.

saturation temperature, *n*—the temperature at which a thermal image reaches its maximum optical density.

sensitizer, *n*—a material which forms an eutectic with the developer to lower the melt point; acting as a solvent with the developer, the leuco dye is solubilized and reacts to form color.

DISCUSSION—Typical materials include parabenzyl biphenyl, DPE, dimethyl DPE, dibenzyl oxalate, PHNT, DMT, DBT, and amide waxes.

slipping layer, *n*—a layer applied to a dye diffusion thermal transfer ribbon which promotes smooth flow of the ribbon through the printer.

smoothness, *n*—a measure of the surface roughness or topography of a thermal substrate, critical for optimum printhead contact.

stabilizer, *n*—materials added to the coating mixture or used in a topcoat to reduce the reversibility and degradation of the color reaction and unreacted background.

static thermal response curve, *n*—the relationship of the response characteristic of a thermal printing system over a given range of print energies; optical (reflectance) density (*y*-axis) versus temperature (*x*-axis). **(F1445, F05)**

thermal imaging transfer ribbon, *n*—plastic film or other material, upon which a dye or pigmented coating is applied; imaging results when a thermal printhead transfers the coating onto a suitable substrate or receptor media.

thermal response, dynamic, *n*—the relationship between the thermal image optical density (*y*-axis) versus printhead energy (*x*-axis); printhead energy density (millijoules/square millimetres) is a function of printhead power times the pulse width (milliseconds) divided by the area of the printhead dot (square millimetres). **(F1405 and F1444, F05)**