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Standard Terminology for Printing Inks, Materials, and Processes¹

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1. Scope

1.1 This terminology standard covers terms used in the description of printing inks, printing materials, and printing processes.

1.2 This terminology standard does not include definitions related to Print Problems (see Terminology D6488).

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- D16 Terminology for Paint, Related Coatings, Materials, and Applications
- D1316 Test Method for Fineness of Grind of Printing Inks By the NPIRI Grindometer
- D1535 Practice for Specifying Color by the Munsell System
- D2066 Test Methods for Relative Tinting Strength of Paste-Type Printing Ink Dispersions
- D3732 Practice for Reporting Cure Times of Ultraviolet-Cured Coatings
- D4040 Test Method for Rheological Properties of Paste Printing and Vehicles by the Falling-Rod Viscometer
- D4302 Specification for Artists' Oil, Resin-Oil, and Alkyd Paints

¹ This terminology is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.56 on Printing Inks.

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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.

- D4361 Test Method for Apparent Tack of Printing Inks and Vehicles by a Three-Roller Tackmeter
 - D4449 Test Method for Visual Evaluation of Gloss Differences Between Surfaces of Similar Appearance
 - D5010 Guide for Testing Printing Inks and Related Materials (Withdrawn 2017)³
 - D5181 Test Method for Abrasion Resistance of Printed Matter by the GA-CAT Comprehensive Abrasion Tester
 - D5383 Practice for Visual Determination of the Lightfastness of Art Materials by Artists and Art Technologists
 - D5403 Test Methods for Volatile Content of Radiation Curable Materials
 - D5909 Test Method for Drying Time of Oxidative-Drying Printing Inks by Squalene Resistance
 - D6488 Terminology Relating to Print Problems
 - D6493 Test Methods for Softening Point of Hydrocarbon Resins and Rosin Based Resins by Automated Ring-and-Ball Apparatus
 - D6687 Guide for Testing Printing Ink Vehicles and Components Thereof
 - E430 Test Methods for Measurement of Gloss of High-Gloss Surfaces by Abridged Goniophotometry
- ### 2.2 Other Documents:
- NAPIM: National Association of Printing Ink Manufacturers, 5th ed. 1988⁴
 - Kipphan: *Handbook of Print Media Technologies and Production Methods*, Kipphan, Helmut: Springer 2001⁵

3. Significance and Use

3.1 A common set of definitions is essential to improve communication and avoid misunderstanding among ink makers, paper makers, and printers.

3.2 Definitions that are verbatim from one of the referenced sources are indicated by giving the acronym of the organization or the author of the book at the end of the definition.

4. Terminology

4.1 Definitions:

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from National Association of Printing Ink Manufacturers, 581 Main St., 5th Fl., Woodbridge, NJ 07095, <http://www.napim.org>.

⁵ Available from Springer Nature, <http://www.springer.com>.

abrasion resistance, *n*—(1) the ability of a coating to resist being worn away and to maintain its original appearance and structure when subjected to rubbing, scraping, or wear. **D16**
(2) resistance against the act of scraping, smudging, or rubbing off. **D5181**

(3) ability to withstand the effects of repeated rubbing and scuffing. **NAPIM**

abrasiveness, *n*—(1) the degree to which a product tends to cause abrasion by the act of rubbing or scraping. **D5181**

(2) the tendency of a substance to wear or scratch other surfaces with which it is in contact. **NAPIM**

absorbency, *n*—the tendency of a porous material, such as paper, to take up liquids or vapors. **NAPIM**

absorption, *n*—soaking in or penetration of liquid components of the ink into the pores of an absorbent substrate (a type of physical drying, like evaporation). **Kipphan**

‘across-machine’ direction, *n*—the perpendicular to ‘with-machine’ direction, referring to a substrate and its passage through printing machinery.

additive, *n*—a substance added in small quantities to another substance, usually to improve properties; sometimes called a modifier (for example, a drier, mildewcide, etc.). **D16**

additive primary colors, *n*—red, green, and blue. **NAPIM**

DISCUSSION—Mixing lights of these colors together can produce a large gamut of colors. When mixed in equal amounts, they produce the sensation of white light.

adhesion, *n*—the tendency of a material to bond to another material, as in the bonding of a printing ink to a substrate.

adhesion promoter, *n*—a material built into the binder or added to the ink to form primary bonds to either the substrate or the previously applied coating, with the specific aim of improving the dry or wet adhesion, or both.

adsorption, *n*—the adhesion of an extremely thin layer of material to the surface with which it is in contact. **NAPIM**

after-tack, *n*—the tendency of a printed surface to remain sticky to the touch even when the ink has completed its drying process.

agglomerate, *n*—a cluster of pigment aggregates that can be broken down by appropriate dispersion and milling operations during ink manufacture.

aggregate, *n*—a cluster of primary pigment particles that cannot be broken down by dispersion and milling operations during ink manufacture.

alkyd, *n*—a group of synthetic resins formed by condensations of polybasic acids with polyhydric alcohols, and modified with drying oils for printing ink use. **NAPIM**

aluminum ink, *n*—see **silver ink**.

aniline ink, *n*—early name for rubber plate printing fluid (flexographic) ink. **NAPIM**

aniline point, *n*—the minimum temperature at which a hydrocarbon solvent is completely soluble in an equal volume of freshly distilled aniline. **NAPIM**

DISCUSSION—Below this point, the mixture is cloudy and separates into two layers. It is used as a measure of solvent power of hydrocarbon solvents.

aniline printing, *n*—an earlier name for flexography, based on the use of the aniline inks that were initially used. **Kipphan**

anilox roller, *n*—an engraved metering cylinder used in flexo presses to transfer a controlled film of ink to the printing plate.

antiskinning agents, *n*—chemical substances that retard the skin formation on the surface of an oxidizable oil or ink (frequently antioxidants). **NAPIM**

apparent tack, *n*—a measure of the force required to split an ink film at the out-running nip of a pair of rollers under a specific set of conditions.

ball mill, *n*—a dispersion device comprised of a rotating cylinder containing balls which cascade; used to disperse a pigment in a vehicle by impact and attrition as the cylinder revolves. **NAPIM**

barrier coating, *n*—the coating applied to a substrate to make it resistant to the permeation of moisture vapor, gases, water, or other liquids including oils. **NAPIM**

base, *n*—*in ink manufacture*, a dispersion of very high pigment-to-binder ratio containing usually only one pigment (or dye) dispersed in a vehicle and subsequently mixed with polymers, solvents, and additives to produce the finished ink. **NAPIM**

basis weight, *n*—the weight in pounds of a ream (500 sheets) of paper cut to a given standard size for that grade. **NAPIM**

DISCUSSION—For example, 500 sheets 25 by 38 of 80-lb. coated for book papers will weigh eighty pounds.

batch, *n*—a discrete quantity of manufactured ink or coating produced by following a formula to completion.

bimetal plate, *n*—*in lithography*, a plate in which the image area is copper or brass and the non-image area is aluminum, stainless steel, or chromium. **NAPIM**

binder, *n*—the components in an ink film which hold the pigment to the printed surface. **NAPIM**

blanc fixe, *n*—precipitated barium sulphate used as a semi-transparent extender in printing inks. **NAPIM**

blanket, *n*—(1) *in offset lithography*, a fabric coated with natural or synthetic rubber which is clamped around the blanket cylinder and which transfers the ink from the press plate to the paper. **NAPIM**

(2) the sheet of elastomer-coated fabric or equivalent placed on the blanket cylinder to receive ink from the plate and offset it to the sheet or web on the impression cylinder.

blanket cylinder, *n*—a rigid roller to which a rubber coating fabric is attached.

blanket wash, *n*—the solvent used to clean the blanket.

bleach, *n*—the method of measuring the tinctorial strength of an ink or toner, usually accomplished by mixing a small portion of the ink (or toner) with a large amount of white base and evaluating the tinctorial strength of the ink versus a control standard. **NAPIM**

blind, *n*—an image area on a plate that will not take ink (not to be used where no image is present).

blinding of lithographic plate, *n*—loss of ink-receptivity in the image areas of the plate.

bloom, (see also **blushing**), *n*—(1) material migrating to the surface of a film. **NAPIM**

(2) coating that forms on rubber blankets when they are left standing.

(3)*v*—migration over time of an incompatible component of a dried printing ink to the surface (for example, wax), often resulting in a reduction in surface gloss.

blown oil, *n*—a product obtained by forcing air through heated drying or semi drying oils, which changes the oil by oxidizing the double bonds.

bodied oil, *n*—a drying or semi-drying oil whose viscosity has been increased (usually by heating). **NAPIM**

body, *n*—(1) a general term referring to viscosity, consistency and flow of a vehicle or an ink.

(2) used to describe the increase in viscosity by polymerization of drying oils at high temperatures. **NAPIM**

body gum, *n*—linseed oil that has been heat polymerized to a heavy, gummy state, commonly used as a bodying agent. **NAPIM**

bodying agent, *n*—a material added to an ink to increase its viscosity. **NAPIM**

boiled oil, *n*—a linseed oil which has been heated to a high temperature for a short time, which increases the viscosity and drying rate. **NAPIM**

DISCUSSION—Boiled oil usually contains a small amount of drier.

brightness, *n*—the intensity of whiteness perceived by a viewer. **NAPIM**

brilliance, *n*—the combined effect of brightness and apparent color strength. **NAPIM**

bronze, *n*—metallic appearance of a color caused by a change in the angles of viewing and illumination. **NAPIM**

bronze powder, *n*—a metallic pigment for printing ink, consisting mainly of copper alloys in fine flakes. **NAPIM**

bronzing, *v*—(bronze busting) applying finely powdered metal particles or flakes to give the appearance of metallic printing. **NAPIM**

n—the metal-like reflectance which sometimes appears at the surface of nonmetallic colored materials.

DISCUSSION—Bronzing is perceived at the specular angle by observing the image of a white light source, for example, and is characterized by a distinct hue of different dominant wavelengths than the hue of the

color itself. The origin of the selective specular reflectance observed is generally considered to be reflectance from very small particle size pigment partially separated from surrounding vehicle at or near the ink film surface.

calender, *n*—a set or stack of horizontal rollers at the end of a paper machine. **NAPIM**

DISCUSSION—The paper is passed between the rollers to increase the smoothness and gloss of its surface.

caliper, *n*—the thickness of a sheet or material, usually expressed in thousandths of an inch (mils). **NAPIM**

cast-coated paper, *n*—a paper or board having a coating which is allowed to harden or set while in contact with a finished casting surface (usually a steam heated drum). **NAPIM**

DISCUSSION—Cast-coated papers have a high-gloss finish.

catalytic coating, *n*—coatings formulated as two-part systems, available in both water and solvent reducible formulas, which use reactive resins that cure to form a thermoset film. **NAPIM**

DISCUSSION—These coatings have good heat and abrasion resistance, high gloss, solvent resistance, and adhere to a wide variety of substrates.

cell, *n*—a small etched or engraved depression in a gravure cylinder or flexo anilox roller that carries the ink.

cellophane, *n*—transparent flexible film consisting of regenerated cellulose and plasticizers. **NAPIM**

centipoise, *n*—a unit measure of viscosity. **NAPIM**

DISCUSSION—One hundred centipoises equal one poise. At room temperature, water has a viscosity of approximately one centipoise, gravure inks of approximately 100 centipoise, and offset inks of approximately 50,000 centipoise.

chalking, *n*—a condition of a printing ink in which the pigment is not properly bound to the substrate by the vehicle and can be easily rubbed off as a powder. **NAPIM**

channel black, *n*—carbon black produced by impinging a natural gas flame against a metal surface. **NAPIM**

DISCUSSION—Because of air pollution control requirements, this type of black has been almost completely replaced by Furnace Black in the U.S.

china clay, *n*—natural, white, inorganic mineral pigment used in paper coatings and as an ink extender, also known as kaolin or Pigment White 19. **NAPIM**

chroma, *n*—(1) one of the attributes of color, characterized by its purity or saturation (strength). **NAPIM**

(2) the attribute of color used to indicate the degree of departure of the color from a neutral color of the same lightness. **D1535**

cleaner sheet, *n*—a sheet of blotter-like stock that is sometimes used as an aid in washing up the inked rollers.

coating, *n*—a liquid, liquefiable or mastic composition that is converted to a solid protective, decorative, or functional adherent film after application as a thin layer. **D16**

cobalt drier, *n*—a material containing chemically combined cobalt used to accelerate oxidation and polymerization of a lithographic ink film. **NAPIM**