

Forensic Document Examination Terms and Definitions

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Forensic Document Examination Terms and Definitions

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Foreword

For over a century general and task specific terminologies and glossaries relating to forensic document examination have been presented in textbooks, technical papers, as well as in technical standards such those available through SWGDOC.¹ This Technical Report continues, consolidates, and updates those efforts.

The use of standardized terminology by forensic document examiners and other forensic service providers promotes consistency across jurisdictions and relieves the judicial system of conflicting terms and definitions.

This document was revised, prepared, and finalized as a technical report by the Forensic Document Examination Consensus Body of the AAFS Standards Board.

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All hyperlinks and web addresses shown in this document are current as of the publication date of this standard.

Key Words: *forensic document examination, terminology*

¹ Available at <http://swgdoc.org/index.php/standards/published-standards>

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Forensic Document Examination Terms and Definitions

1 Scope

This technical report provides terms and definitions used by forensic document examiners in forensic examinations and comparisons involving the complex and ever-expanding range of issues concerning the forensic examination of documents.

The range of terms includes the varied materials, technologies, and methods used to generate documents and those used in their forensic examination.

Some terms and definitions in this Technical Report might vary from the usage of other forensic disciplines.

2 Normative References

There are no normative reference documents.

3 Terms and Definitions

3.1 General Terms Relevant to Forensic Document Examinations

3.1.1

absent character

A character or character combination which is present in one body of writing but is not present (for example, does not have a corresponding character) in another body of writing.
(SWGDOC E01)

3.1.2

Analysis, Comparison, Evaluation (see individual terms)

ACE

A summary by Huber (1959) of three distinct stages through which the forensic or other examiner must pass, consciously or otherwise, in the course of any comparative examination.

NOTE These terms are similar to “study, comparison and interpretation” and “recognition, comparison and correct interpretation” (Osborn, AS, 1910, pp 89, 105)

3.1.2.1

analysis

The “unknown” item must be classified according to its properties or characteristics. These properties can be directly observable, measurable, or implied, but they are the parts which make up the whole.

(based on Huber, 1959)

3.1.2.2

comparison

A comparison is made of the properties of the item found through analysis with the known or recorded properties of others whose identity is unquestioned.

(based on Huber, 1959)

3.1.2.3 evaluation

It is not sufficient that the comparison disclose similarities or dissimilarities in any of the characteristic properties of knowns and unknowns. Each property will have a certain value for identification purposes, determined chiefly by its relative frequency of occurrence. The weight or significance of each must be considered.

(based on Huber, 1959)

3.1.3 active coat

A coating layer which contains the primary image (color) forming components.

3.1.4 aliasing

The stair stepped or jagged effect resulting from analog to digital conversion (see [3.1.290 pixelation](#)).

3.1.5 alignment (handwriting)

Position of writing with respect to a real or imaginary baseline.
(NIST HF)

3.1.6 alignment (typewriting)

The adjustment of various mechanisms of a typewriter to ensure the even printing of the characters and their proper positioning relative to the baseline and to the other characters.
(SWGDOC E04-13)

3.1.7 alignment (general)

The appearance or position of a handwritten or printed character(s) or text relative to a real or imaginary baseline or to another handwritten or printed character(s) or text.

3.1.8 alignment defect

A deviation from the intended appearance or position of a character relative to another character (see [3.1.204 impression defect](#)).

NOTE Alignment defects are usually categorized as vertical misalignment (character too high or low relative to the baseline established by the other characters), horizontal misalignment (character too far to the left or right relative to the other characters), and twisted or leaning (character leans to the left or to the right); because they are corrected in the alignment process, impression defects are considered as alignment defects.
(SWGDOC E04-13)

3.1.9 allograph

Different forms of the same character such as capital hand-printed “A” and cursive “a.”
(Adopted from HH)

3.1.10 alteration

A modification made to a document by any combination of physical, chemical, or mechanical means including, but not limited to, obliterations, additions, overwritings, or erasures.
(ANSI/ASB 035)

3.1.11 anti-stokes luminescence

Photoluminescence whose radiation is located in a spectral region of shorter wavelengths than that of the exciting radiation.

NOTE This happens, for instance, when the energy of the emitted photons originates from the absorption of two exciting photons.
(CIE S 017/E:2011 ILV)

3.1.12 apex

The uppermost point of a character.
(SWGDOC T01)

3.1.13 apprentice

A student under in-person, direct supervision of a principal trainer on an almost daily basis. There may or may not be a financial arrangement between the trainer and apprentice.

3.1.14 apprenticeship

An arrangement in which an individual is learning knowledge, skills, and abilities through practical experience under a skilled worker(s).

NOTE The apprentice is expected to be a full-time trainee under the auspices of a principal trainer. The apprentice works with the principal trainer almost daily in their laboratory or office.

3.1.15 arcade

Stroke used to form the arcs of the cursive letters m and n; also a cursive writing style where upward arc forms predominate. May be referred to as over curve.



3.1.16 arm

A stroke that is attached at one end to another portion of the character such as that in the upper right portion of the upper case "K".



3.1.17 arrangement (general)

The placement of handwritten or printed text on the page, including characteristics such as margins, interline and inter-word spacing, indentations, and paragraphing.
(based on NIST HF)

3.1.18 artifact

Any distortion, alteration, or information not present in the original object or image, produced by an external agent or action, or inadvertently introduced by image copying, capture, processing, compressions, transmission, display, or printing.

3.1.19 ascender

A stroke that rises above the height of the body of the letter formation.
(SWGDOC T01)

3.1.20 assisted hand signature

A signature executed by a writer while the writer's hand, arm, or writing instrument is steadied or stabilized by another.
(SWGDOC T01)

3.1.21 authorized document

a document made or issued by or under the authority of a governmental or private organization or an individual.

3.1.22 awkward hand

(See [3.1.412 unaccustomed hand.](#))
(SWGDOC T01)

3.1.23 ball element

An element used in a single element typewriter in which the fully formed characters are located on the outer surface of a spherelike device. Frequently called golf ball element.
(SWGDOC E04-13)



3.1.24 ballpoint pen ink

Writing or marking media intended for use in a ball point pen. Typically, a thick, high viscosity ink with an oil, glycol, or rubber base.
(SWGDOC M01)

3.1.25 ball terminal – typewriting

Small round globe on some typefaces.

3.1.26 banding

Uniform density variations or voids in a given color which appear in the direction that the printhead travels.
(ASTM F1857)

3.1.27**base**

The lowest element of letters such as the capital letters “E” and “L”.

3.1.28**baseline**

The ruled or imaginary line upon which writing, typographic printing, or typewriting appears to rest.

3.1.29**batch to batch variation**

Within an ink formulation, difference in the concentration of a component of an ink formula due to deviations during production that are within the manufacturer’s tolerance limit.
(SWGDOC M01)

3.1.30**bead defect**

Inked or un-inked impression or hole in the paper caused by a contaminant particle encased in plating material located on or adjacent to the printing area of the typeface on a metal coated element.
(SWGDOC E04)

3.1.31**bias**

A tendency to give disproportionate weight for or against an idea or thing.

3.1.32**bias, cognitive**

The effect of a set of influences, which can be unconscious, on the reliability and validity of an individual’s observations and conclusions.

3.1.33**bias, confirmation**

The tendency to search for data or interpret information in a manner, which can be unconscious, that supports one’s preconceptions, expectations or desires.

3.1.34**bias, contextual**

The effect on the evaluation and interpretation of data of exposure to outside influences, which can be unconscious, or to information or that is either irrelevant to the judgmental task or inappropriate for consideration.

3.1.35**black write**

Process in electrostatic printing in which the photoconductive element is charged with a charge of the same sign as that of the toner. A light beam, used like a “stylus” is used to discharge only those areas that are to receive toner to form the image. In the development process, the charged background areas repel the like charged toner to the discharged areas on the photoconductor.
(ASTM F909)

3.1.36

bleed

Ink feathering of one color into an adjacent color over time.
(ASTM F1857)

3.1.37

blemish

A small extraneous spot found near inked regions of checkwriter impressions that is characteristic of machines that use ribbons as their ink source.
(SWGDOC E07)

3.1.38

boat

A dish-shaped figure consisting of a concave stroke and straight or curved stroke sometimes forming the base of letters.

3.1.39

bone folder

A piece of shaped bone or other material, such as plastic or Teflon, typically used by bookbinders to crease paper and to separate pieces of paper that are stuck together.
(SWGDOC P01)

3.1.40

bowl

A curved stroke joining a stem that partially encloses an area forming an open cup-like shape.

3.1.41

buckle

The eyelet that is often used to form the middle of such letters as the cursive capital letters "K", "R", and "B", where an element of a letter connects, abuts, or is closely adjacent to the staff.

3.1.42

bulletin

Type designs with a cap height greater than the height of the Roman type, usually used with a horizontal spacing of 3.5 mm or more per character or space (greater than or equal to 8 pitch).

3.1.43

cap

The uppermost element of letters such as the capital letters "F" and "T".

3.1.44

caps height- typewriting

Height of a font's uppercase letters, measured by the letter "H".

3.1.45

carbon paper

A sheet composed of a supporting substrate on one or both sides of which is a coating containing a transferable (usually colored) material. The coating is of such nature that it will transfer in part or entirely to a copy sheet at the point of pressure contact.
(ASTM F221)

3.1.46**case file**

All case notes, correspondence provided by interested parties, images of submitted documents, billing and time sheets (where applicable), and any task-irrelevant information received. This file may be wholly or partially in an electronic format.

3.1.47**case notes****examination notes**

The record of procedures, standards, controls and instruments used, observations made, results of tests conducted, charts, graphs, images, audio, video, and other documentation generated during the examiner's analysis. This also includes any resulting findings, opinions, and conclusions.

3.1.48**certified reference material****CRM**

Reference material, accompanied by documentation issued by an authoritative body and providing one or more specified property values with associated uncertainties and traceabilities, using valid procedures.

(JCGM 200:2012)

3.1.49**character**

Any language symbol (for example, letter numeral, punctuation mark, or other sign), other symbol, or ornament.

(SWGDOC E01)

3.1.50**character pitch**

The number of characters that can be printed in a horizontal 1 in. (25.4 mm).

(ASTM F1457)

3.1.51**character spacing****horizontal escapement**

The width allotted to each character in a fixed pitch (monospacing) typewriter or to the basic unit in a proportional spacing typewriter; usually expressed in millimeters or as a fraction of an inch.

(SWGDOC E04)

3.1.52**characteristic**

A feature, quality, attribute, or property of an item.

(SWGDOC E01)

3.1.53**characteristic, class**

A feature determined prior to manufacture that is intended to be present in a particular form in every member of a group and can be used to define that group.

3.1.54**characteristic, common (handwriting)**

A feature found in a similar, but not necessarily exact, form in the handwriting of individuals who are not members of a definable group and is not attributable to the study of a particular handwriting system.

3.1.55**characteristic, group (handwriting)**

A feature found in a similar, but not necessarily exact, form in the handwriting of individuals who are members of a definable group and is not attributable to the study of a particular handwriting system.

3.1.56**characteristic, (individual, distinguishing) (non-handwriting)**

A deviation from a class characteristic that would be present only by chance in another member of the class.

3.1.57**characteristic, (individual, distinguishing) (handwriting)**

A feature found in handwriting that is not attributable to a class of writing and it is not taught. Only in combination would this characteristic(s) distinguish class from non-class.

3.1.58**characteristic, subclass (non-handwriting)**

A feature determined prior to manufacture that is intended to be present in a particular form in every member of a sub-group within a class and can be used to define that sub-group.

3.1.59**characteristic, system (handwriting)**

A feature found in an individual's handwriting that is attributable to the study of a particular handwriting system.

3.1.60**characteristic, transitory**

A feature or defect that can be modified over time or removed entirely by use, cleaning, replacement, or repair.

3.1.61**charred documents**

Items damaged by heat or fire.
(SWGDOC P01)

3.1.62**checkwriter**

A device manually or electrically powered or computer generated, designed to ink, emboss, print, perforate, or shred a monetary value, along with other peripheral information, onto a document.
(SWGDOC E07)

3.1.63**chromatography**

A method of separating substances that is widely used in analytical and preparatory chemistry. It involves the flow of a liquid or gas mobile phase over a solid or liquid stationary phase. As the mobile phase flows past the stationary phase, a solute will undergo repeated adsorption and desorption and move along at a rate depending, among other factors, on its ratio of distribution between the two phases. If their distribution ratios are sufficiently different, components of a mixture will migrate at different rates and produce a characteristic pattern (chromatogram). (SWGDOC M01)

3.1.64**circularity**

Ratio of a single ink dot height divided by its width with 1.0 being a perfect circle. (ASTM F1857)

3.1.65**class**

Characteristic(s) shared by a group (e.g., a copybook style of writing, a specific type style, print process).

3.1.66**class defect****common defect**

A deviation from a class characteristic that is present in a similar, but not necessarily exact, manner in a significant number, even most, but not all, of the members of a class or subclass.

3.1.67**closed loop**

A loop formation that approximates a retrace, where the sides of the loop run parallel together.

3.1.68**coalescence**

Puddling or pooling of adjacent ink drops on the substrate before they can be dried or absorbed resulting in non-uniformity of color density. (ASTM F1857- Withdrawn 2020)

3.1.69**cockle**

Of paper, A defective, puckered condition of a paper sheet as a result of nonuniform hygroexpansion which can be related to any nonuniformity in the sheet, including mass distribution and drying stresses.

(ASTM D1968)

3.1.70**coincidental peripheral printing**

resulting from an impression of unintended printing areas, often on the periphery, of a stamp. This may be due to the manufacturing process or the stamping technique.

(SWGDOC E10)

3.1.71
collapsed side

Occurs in the formation of the cursive letters "m" and "n" when the left or right arcade is formed as a retrace or near retrace movement.

3.1.72
collate

1. Analyze and compare to identify points of agreement and difference; critical comparison or side by side examination.
2. Arrangement of paper in proper sequence, such as photocopiers.

3.1.73
collected writing
handwritten standard

A subset of known writing. Samples of a known person's handwriting/signatures that have been produced throughout the course of day-to-day business, are typically not related to the case at hand, and have been collected for the purposes of comparison against questioned material. Examples include letters, diaries, business records, forms, or checks. These are also known as normal course specimens, course of business specimens, or dictated writing.

3.1.74
color-shifting ink

An ink that reflects various wavelengths of white light differently, depending on the angle of incidence to the surface.

3.1.75
common writership

A comparison of handwriting where the FDE is asked to give an opinion on whether a group of questioned documents have been produced by the same writer (see [3.1.224 intra-comparison](#)). (NIST HF)

3.1.76
comparable (general)

Pertaining to items that contain the same type(s) of characteristic or features, individually or in combination.

3.1.77
comparable (handwriting)

Pertaining to handwritten items that contain the same type(s) of writing and similar characters, words, and combinations. Contemporaneousness and writing instruments may also be factors. (SWGDOC E01)

3.1.78
competency

Possessing and demonstrating the requisite knowledge, skills, and abilities to successfully perform a specific forensic document examination task, as per ANSI national standards.

**3.1.79
complexity**

A combination of speed, skill, style, and construction that contributes to handwriting being difficult to simulate.

(NIST HF)

**3.1.80
conclusion**

A judgement or decision reached by reasoning based on the examination and evaluation of all observations, findings, and available task relevant information.

NOTE Conclusions expressed by forensic document examiners are expert opinions based on the characteristics, features, or information under observation and interpreted using the training, knowledge, skills, abilities, and experience of a specific forensic document examiner.

**3.1.81
conclusion, classification**

A conclusion in which an examiner is assessing the type or classification of a single item (e.g., whether a document was produced by a particular printing process, typed by the same typewriter).

**3.1.82
conclusions, source**

Conclusions in which an examiner is assessing at least two opposing propositions: whether or not two (or more) items came from the same source (e.g., whether unknown and known items came from the same source), or whether or not one (or more) item(s) came from a specific source (e.g., whether a typewritten document was produced by a specific typewriter).

**3.1.83
connecting stroke**

A line joining two adjacent characters.

(SWGDOC T01)

**3.1.84
connections**

The union of two characters e.g., in cursive writing.

(Modular Method)

**3.1.85
contemporaneous writing**

A document or a sample of writing that was prepared around or about the same timeframe as the document in question. The timeframe may be determined by the task at hand.

**3.1.86
continuous spray**

Ink jet technology where drops are generated at a regular unbroken rate. Images are then generated by deflections of the ink droplets after they are charged so they are either intercepted by a catcher and not permitted to impact the substrate or deflected to intercept the substrate at specific locations.

(SWGDOC E06)

3.1.87**continuous tone**

A characteristic of an image such that it has all the values (0% to 100%) of gray (black and white) or color in it. A continuous tone can be approximated by the use of thousands or millions of gradations of black and white or colors.

3.1.88**conventional printing**

A group of processes that utilize printing plates and fall into four categories including planographic, relief, intaglio, and screen printing methods.

3.1.89**copybook**

A manual of writing instruction that provides models to be copied by the student.

3.1.90**corona**

Device used to place a uniform electrical charge on the surface of a xerographic photoreceptor. (ASTM F1457)

3.1.91**correctable ribbon**

A ribbon that produces an image that is designed to allow for the removal of the image from the substrate by means of liftoff correction media.

3.1.92**correction media**

Ribbons, tapes, and sheets designed to be struck by the typeface to coverup or liftoff typed text. (SWGDOC E04)

3.1.93**counter (manually or machine produced)**

An enclosed or partially enclosed space inside a letterform or symbol, e.g., "O", "p", "e" and "g" or forms such as "G" and "c".

3.1.94**counterfeit document**

A document that purports to be genuine but is not, because it has been falsely altered, completed, signed, or endorsed, or contains a false addition thereto or insertion therein, or is a combination of parts of two or more genuine documents. It may be called an altered document or a forged document.

[Based on 18 USC 513 (c) (2)]

3.1.95**coverup**

Obliteration of text or images by means of an opaque material.

3.1.96

coverup correction

(See [3.1.272 overprint correction.](#))

(SWGDOC E11)

3.1.97

cracking

Condition in which ink that has been absorbed into a substrate causes the coating to shrink to a state much smaller than the original coating dimension causing fractures in the image area.

(SWGDOC E06-13)

3.1.98

cross mark

usually an "x" used as a signature and, if witnessed, may be legally binding. Also known as "His Mark".

3.1.99

cross stroke

A stroke that crosses another portion of the character and is not attached at either end (for example, the horizontal stroke of the "t".) (see [3.1.100 crossbar](#)).

(SWGDOC T01)

3.1.100

crossbar

A stroke that intersects other portions of the character at both ends (see [3.1.16 arm](#) and [3.1.99 cross stroke](#)).

(SWGDOC T01)

3.1.101

crystallization

Condition in which ink evaporates and forms crystals.

(SWGDOC E06-13)

3.1.102

cursive

A type of writing in which the letters are joined and the writing instrument is not lifted after most strokes.

(SWGDOC T01)

3.1.103

daisy wheel element print wheel

An element used in typewriters or computer printers in which the fully formed characters are contained on the ends of fingerlike projections radiating out from the center of a disk.

(SWGDOC E04)

3.1.104**defect, subclass**

A feature not determined prior to manufacture that is an unintended deviation from a class characteristic, which is present in a particular form in all members of a definable sub-group of items within a class, generally caused by one or more Randomly Acquired Characteristics (RAC) of the tool(s) or equipment producing the items while in the same approximate condition.

3.1.105**descender**

A stroke that extends below the baseline of the body of the letter formation.

(SWGDOC T01)

3.1.106**detached letter**

A letter, which when alone, constitutes a word, such as "I" and "A". Also, a letter which is not connected to the remaining letters of a word, such as the capital letter in some names.

3.1.107**diacritic**

Those dots, lines, and swoops that appear above, below, and occasionally even beside certain letters in words. The purpose of diacritical marks is to change the sound of the individual letter they are marking or to change the meaning of an entire word by changing which syllable is accented. Often incorrectly used to describe such characteristics as the "i" and "j" dot.



Déjà vu

3.1.108**diagonal stroke**

A slanting stroke, as in the center stroke of the printed capital "N".

3.1.109**dichroic filters**

A filter with two transmission bands. These bands are usually widely separated, and can be of significantly different size.

(SWGDOC M01)

3.1.110**dielectric printing process**

Nonimpact printing technique in which specially treated paper consisting of a conductive base layer coated with a nonconductive thermoplastic material is used to hold an electric charge usually applied directly by a set of electrode styli. The electric charge corresponds to the latent image of the original. Following the charging step, the paper is imaged by a toner system similar to that of electrostatic copying devices. This technique is sometimes called electrographic, and is currently used on general purpose non-impact printers, plotting and facsimile devices.

(SWGDOC E05)

3.1.111**difference**

Consistent, repeated dissimilarity in a structural or other characteristic or feature, that cannot be reasonably explained as variation or deviation from natural variation of a single source or class. May be referred to as a significant or fundamental difference.

3.1.112**diffuse reflection**

Diffusion by reflection in which, on the macroscopic scale, there is no regular reflection.
(CIE S 017/E:2011 ILV)

3.1.113**digital image**

An image that is represented by discrete numerical values organized in a two-dimensional array; when viewed on a monitor, projected image or printed on paper, it appears similar to a photograph.
(SWGIT/SWGDE)

3.1.114**digital image processing**

Any activity that transforms a digital image.
(SWGDOC E03) (ANSI/ASB Std 035)

3.1.115**digital printing**

A method of printing from a digital-based image directly to a variety of media.

3.1.116**direct contact**

Two sheets of paper, one on top of the other, with no intervening sheets.
(SWGDOC E02)

3.1.117**direct thermal product**

Substrate coated with a heat sensitive formulation for the purpose of creating an image when heat is applied from a thermal printhead.
(F1623).

3.1.118**directional change**

A modification in the progress of the written line; such changes can occur as gradual curves, abrupt angles, or curves and retracings.

3.1.119**directional skipping**

A skip in a handwritten line that may occur after an abrupt change in the direction of the stroke.

3.1.120**disguised writing**

Deliberately altered in an attempt to hide normal writing habits.
(Modular Method)

3.1.121**dissimilarity**

A feature or characteristic observed in one item or group of items that is not observed in the same form in a comparable item or group of items.

3.1.122**distorted writing**

Does not appear to be, but may be natural. This appearance can be due to either voluntary factors (for example, disguise, simulation) or involuntary factors (for example, physical condition of the writer, writing conditions).

(NIST HF, ASTM 2290-03; SWGDOC E01)

3.1.123**distributed learning**

Educational methods that use models of distant or remote education such as video, the internet, networked multimedia, and independent or proctored study models. This does not replace a robust in-person training program, but is used to complement that training.

3.1.124**document**

Any material containing marks, symbols, or signs visible, partially visible, or invisible (to the naked eye) that may ultimately convey meaning or a message.

(Kelly Lindblom)

NOTE This definition of a document is broad; it extends to electronic documents, including e-mail and other electronic communications, word processed documents and databases. In addition to documents that are readily accessible from computer systems and other electronic devices and media, the definition covers those documents that are stored on servers and back-up systems and electronic documents that have been 'deleted'; it also extends to additional information stored and associated with electronic documents known as metadata.

(Practice Direction 31A – Disclosure and Inspection UK)

3.1.125**dot matrix**

A method of character generation in which each character is formed by a pattern of dots selected from a grid or matrix.

3.1.126**downstroke**

The part of a letter that is made when the writing instrument is moving from the top to the bottom of a letter.

3.1.127**drag line****drag stroke****hairline (handwriting)**

A stroke resulting from incomplete lifting of the pen, usually faint in ink coverage. Also, a very thin or light stroke of a writing instrument in areas where its movement is not normally recorded.

3.1.128**drop on demand**

Ink jet technology where drops are generated as needed to create an image.

(SWGDOC E06)

3.1.129

dry letter transfer process

Plastic lettering on specially prepared paper which can be transferred to a substrate by the application of pressure.

3.1.130

dry seal

A non-inked mechanical device which embosses a design on paper.
(SWGDOC E08)

3.1.131

dry toner

Material in a dry developer system which when deposited on a substrate by the field of an electrostatic charge pattern, becomes the visible record.
(SWGDOC E05)

3.1.132

dual component development

Mixture of dry toner and iron oxide developer that is used for developing electrostatic images in copiers.
(SWGDOC E05)

3.1.133

ductus

The direction, sequencing, and speed with which the strokes making up a character are executed.

3.1.134

dye diffusion thermal transfer

dye sublimation

An imaging process that uses thermal dye ribbons with selected organic dyes, the imaging characteristics of which are different from the pigmented materials used in thermal transfer wax ribbons.

3.1.135

electric typewriter

A typewriter in which an electromechanical device causes the type element to be activated when the keys are struck.
(ASTM F909)

3.1.136

electromagnetic radiation

Emission or transfer of energy in the form of electromagnetic waves with the associated photons.

NOTE The French term “radiation” applies preferably to a single element of any radiation, characterized by one wavelength or one frequency.
(CIE S 017/E:2021 ILV)

3.1.137**electronic document**

Text, graphics, or spreadsheets generated by computer on any media or device for any electronic processing. Electronically stored documents follow no format or readability requirements except when retrieved for human-use.

3.1.138**electronic typewriter**

An electric typewriter in which the keyboard input is received by an electronic processor built into the typewriter. This unit then controls the print head and other features to produce the typing action.

(ASTM F909)

3.1.139**electrophotography**

A non-impact printing process in which the image is formed using photoconductive paper or a photoconductive intermediate drum.

3.1.140**electrostatic detection device****EDD**

An instrument that uses an electrostatic charge along with toner distribution as the mechanism to visualize paper fiber disturbances (for example, indentations and erasures).

(ANSI/ASB 044)

3.1.141**element**

The interchangeable typeface carrier of a single element typewriter. See ball element, daisy wheel element, thimble element.

(SWGDOC E04)

3.1.142**embellishments**

Flourishes, ornaments, paraps, rubrics and underscores. It adds or extends strokes that are easily executed and are not essential to the recognition of the character or the word.

(NIST HF)

3.1.143**embossment variation**

Nonuniformity of the dry seal impression on the paper stock. It can be caused by the manner of application or by defects in the dry seal.

(SWGDOC E08)

3.1.144**emission (of radiation)**

Release of radiant energy.

(CIE S 017/E:2011 ILV)

3.1.145**empty magnification**

Occurs when the image continues to be enlarged, but no additional detail is resolved.

3.1.146**enhancement**

A process to reveal, intensify, magnify, or clarify an observation. Image enhancement is the process of adjusting a digital image, making it more suitable for display or further image analysis. For example, sharpening or brightening an image.

3.1.147**erasure**

The area where material has been removed from a document by chemical, abrasive, or other means. (SWGDOC E03) (ANSI/ASB 035)

3.1.148**evidence**

(See [3.1.226](#) item.)

3.1.149**examination**

The process of observing, searching, detecting, recording, prioritizing, collecting, analyzing, measuring, comparing and/or interpreting.

3.1.150**excitation**

Elevation of the energy levels of atoms, molecules or ions to higher energy levels. (CIE S 017/E:2011 ILV)

3.1.151**exclusion****elimination**

The determination that there are sufficient characteristics in disagreement, with no significant limitations, to support an opinion that two or more items did not originate from the same source.

3.1.152**exemplars**

Samples of handwriting, printed text, paper, ink, etc., known (or purported) to have been produced by a particular individual, machine, or manufacturer.

3.1.153**external (extrinsic) factors (handwriting)**

Writing conditions such as underlying writing surface, substrate, writing implement, writing position, interruptions during the writing activity etc. that affect the handwriting movement or the resulting writing.

(NIST HF)

3.1.154

eyelet

Often found in cursive writing, a small oval or loop formation that is not an essential part of a handwritten character.

3.1.155

fabric ribbon

An inked ribbon wherein the substrate is a woven cloth material, such as nylon, cotton, or silk.

3.1.156

fabricated document (fictitious instrument)

Purported to be genuine but is not, because it has been falsely manufactured, altered, completed, signed, endorsed, contains a false addition thereto or insertion therein, or is a combination of parts of two or more genuine documents.

3.1.157

family (of type)

A class of type designs sharing basic qualities of style and artistic expression that differentiate it from other similar designs.

(SWGDOC E04)

3.1.158

feathering

The condition in which the writing/printing fluid spreads laterally in a pattern that usually follows the direction of the surface fibers away from the written or printed line.

3.1.159

financial document

An obligation, security, or other representative of value made or issued by or under the authority of a governmental or private organization.

3.1.160

finding

Information concluded as a result of an examination.

(ISO 21043-1:2018)

3.1.161

fixed pitch

Describes a character set in which all character cells are of equal width (see proportional spacing).

(ASTM F1457)

3.1.162

fixing film

Clear plastic sheet with a pressure sensitive adhesive layer.

(ANSI/ASB 044)

3.1.163

flashing

Excess material from a molding process.

(SWGDOC E04)

3.1.164**flexography**

A form of relief printing like letterpress, but using a flexible rubber or resilient photopolymer relief plate(s).

3.1.165**flourish**

A final writing movement of a free sweeping line made over or under text; sometimes a simple terminal stroke or dot. A stroke designed for ornamentation. Also called paraph.

3.1.166**flow back**

An increase in the density of the ink line caused by excess ink running back onto the previous portion of a stroke, occurring as the pen is lifted from the paper.

3.1.167**fluorescence**

A process by which radiant flux of certain wavelengths is absorbed and reradiated nonthermally at other, usually longer, wavelengths.

(ANSI/ASB Std 035)

3.1.168**foil stamping**

Various colored foils made of metals or other materials which are typically combined with embossing or debossing, carried on a plastic sheet, and transferred through a stamping or heated die process on to a substrate.

3.1.169**forensic document examiner****FDE**

Addresses inquiries that arise in matters where the authenticity, genuineness, or source of documents is questioned; does not involve the study of handwriting for personality assessment, creation of a personality profile, or analysis, or judgment of a writer's personality or character.

(ASB 011-Draft)

3.1.170**forensic science**

The application of scientific principles and techniques to matters of the law especially as relating to the collection, examination, and analysis of physical evidence.

3.1.171**forensic science practitioner**

An individual who (1) applies scientific or technical practices to the recognition, collection, analysis, or interpretation of evidence at issue in criminal, civil, or administrative investigations and proceedings, and (2) issues test results, provides reports, or provides interpretations, conclusions, or opinions through testimony with respect to such evidence.

3.1.172**forged document**

A document that purports to be genuine but is not, because it has been falsely altered, completed, signed, or endorsed, or contains a false addition thereto or insertion therein, or is a combination of parts of two or more genuine documents.

3.1.173**fracture pattern**

The spatial arrangement of each complementary edge formation created when a single object is separated into two or more fragments.

(SWGDOC E11)

3.1.174**fugitive ink**

An ink that will run and/or stain when it comes in contact with water or any aqueous type of solution.

3.1.175**full color copier/printer**

Office machines that can reproduce color originals containing gradations of color (see [3.1.231 laser printer](#), [3.1.216 ink jet process](#)).

3.1.176**fuser roll**

Heated roller that contacts the paper and toner directly and is part of the fuser unit.

(ASTM F1434)

3.1.177**garland**

A rounded, trough-like stroke such as that in the u; an individual style of handwriting with a predominance of these types of strokes. May be referred to as under curve.


3.1.178**gel pen ink**

An aqueous ink of high viscosity. Often characterized by tram lines on the outside of the ink line and a trough on the interior.

3.1.179**glyphs**

The shapes that characters can have when they are rendered or displayed. In contrast to characters, glyphs appear on the screen or paper as particular representations of one or more characters. A repertoire of glyphs makes up a font.

(Unicode 12.0.0, 2.2)

3.1.180**gooping**

Extraneous deposits of ink on the document surface caused by built up ink on the housing of ball point pens, typically found at a point of re-direction of the written line.

3.1.181

gravure

An intaglio printing process in which the image area of the printing plate consists of cells or wells rather than recessed lines.

3.1.182

ground truth

Information provided by direct observation as opposed to information provided by inference.

3.1.183

gripper bar

picker bar

A grabbing device used in the delivery system to transport individual sheets of paper in a printer or copier.

3.1.184

gripper marks

Visible or latent indented features in paper resulting from gripper bars in a printing or copying system.

3.1.185

guided signature

A signature executed while an impaired writer's hand, arm, or writing instrument is controlled by another.

3.1.186

guidelines

Lines that show a route to follow when simulating handwriting or signatures. These can exist in the form of pencil lines or indentations or be created by the use of transmitted light shone through a document containing the entries to be copied.

(NIST HF)

3.1.187

hairline (typography)

The thinnest line found in a specific typeface that consists of lines of varying widths, usually common to serif typefaces.

3.1.188

halftone

Print process in which a series of dots of variable diameter and regular interdot spacing is used to print photographs and drawings.

3.1.189

hand printing

A style of writing in which the letters are not joined and the writing instrument is lifted after most strokes.

(SWGDOC T01)

3.1.190
handwriting

Writing in any form (such as cursive, hand printing, signatures, numbers). Although “handwriting,” is used as a general term, it may be produced by the hand, mouth, foot, or other body part by directly manipulating a writing instrument.

3.1.191
handwritten item

An item bearing handwriting.

3.1.192
hesitation

A pause in the writing without the instrument being lifted.
(SWGDOC T01)

3.1.193
hiatus

In cursive writing, a space caused by lifting the writing instrument at the conclusion of one letter, followed by the reapplication of the instrument to begin the next letter of a word; also referred to as a break or pen lift. May be an individualized habit.



3.1.194
identification document

Made or issued by or under the authority of a governmental or private organization which, when completed with information concerning a particular individual, is of a type intended or commonly accepted for the purpose of identification of individuals.

3.1.195
image

A visually observable counterpart of an object produced by means of imaging technology.
(SWGDOC D01)

3.1.196
image area

That portion of the page that is printed, including the space between letters and lines.
(F1457)

3.1.197
image enhancement

Any process intended to improve the visual appearance of an image or specific features within an image.
(ASTM E2916)

3.1.198
image formation

The elements that comprise an image to include, but not limited to, continuous inked areas, halftone patterns, and dot characteristics.

3.1.199

image density

Contrast between image and background as measured by densitometer.
(ASTM F221)

3.1.200

imaging drum

Photoreceptive drum coated with a charge-sensitive material used in the image transfer systems of toner devices.
(SWGDOC E05)

3.1.201

imaging film

Thin transparent plastic material that covers the item during an examination using an EDD.
(ANSI/ASB Std 044)

3.1.202

impact printer

A printer in which printing is the result of mechanical impacts (e.g., dot-matrix, typewheel printer).
(SWGDOC E04)

3.1.203

impression

An image formed by pressure.
(SWGDOC E11)

3.1.204

impression defect

A deviation from the intended evenness in appearance of a character over the entire impression of the character or relative to the impression of another character (see [3.1.263 off-foot](#)).
(SWGDOC E04).

3.1.205

impression format

The manner in which the paper is embossed or shredded.
(SWGDOC E07)

3.1.206

inconclusive opinion

An opinion expressed when an examination has been undertaken, but the FDE is unable to make a determination with regard to writership or source, for example because of the presence of both similarities and dissimilarities.

3.1.207

indentations

Latent or visible impressions and/or embossments in paper or other media. This also includes paper fiber disturbances which do not optically appear as impressions.
(ASB S044-19)

3.1.208**indigo printing**

Created directly from digital data, charged ink particles are applied to an imaging drum and then transferred to a print blanket.

3.1.209**indirect contact**

Two sheets of paper, one on top of the other, with one or more intervening sheets.
(SWGDOC E02)

3.1.210**individual prefix**

A prefix especially designed for a particular customer.
(SWGDOC E07)

3.1.211**individualizing characteristics
distinguishing characteristics**

Marks or properties that serve to characterize an item(s) and distinguish it from similar item(s).

NOTE Both class characteristics (marks or properties that associate individuals as members of a group) and individual characteristics (marks or properties that differentiate the individual members in a group) are individualizing characteristics.

3.1.212**infrared****IR**

Referring to radiant flux having wavelengths longer than the wavelengths of visible light, usually from ~700 nm to 1400 nm (~0.7 μm to 1.4 μm) as per the International Commission on Illumination (CIE) for IR-A.
(ANSI/ASB Std 035)

3.1.213**infrared luminescence****IRL**

The emission of radiant energy during a transition from an excited electronic state of an atom, molecule, or ion to a lower electronic state (fluorescence or phosphorescence, or both), where the spectrum of the excitation source is in the ultraviolet (UV) or visible region of the electromagnetic spectrum, or both, and the spectrum of the emitted energy is in the far red or infrared (IR) region of the electromagnetic spectrum.
(ANSI/ASB Std 035)

3.1.214**initial stroke**

Written movement at the beginning of a character. (Also known as beginning or commencement stroke.)

3.1.215**ink formula**

A precise recipe or set of ingredients and their quantities that the manufacturer specifies for the final ink product. These ingredients are colorants (dyes and pigments) and components (volatile solvents, resins, etc.).

(SWGDOC M01)

3.1.216**ink jet process**

A non-impact printing method in which the image is formed by projecting droplets of a liquid or solid printing medium onto a substrate.

3.1.217**ink library**

An organized collection of reference samples of inks and related materials.

(SWGDOC M02)

3.1.218**inked ribbon**

A ribbon composed of a supporting substrate of film, fabric, or paper and a coating or impregnation of a coloring material. The coloring material is of such nature that it will transfer in part or entirely to a copy sheet at the point of pressure contact.

(ASTM F221)

3.1.219**insufficient**

A determination made by an FDE that the material to be examined does not contain enough information for an examination to be conducted. This may be due to the amount, complexity, comparability, or line, reproduction or writing quality of the material. In many instances, FDEs report an inconclusive opinion, explaining limitations/insufficiency, rather than reporting an insufficient opinion.

(NIST HF)

3.1.220**intaglio printing**

Process in which the image areas are below the non-image areas of the plate, resulting in raised printing on the substrate.

3.1.221**inter-comparison**

Comparison between two or more items to determine whether or not they share a common source.

3.1.222**internal (intrinsic) factors**

Conditions such as age, illness, disease, fatigue, emotional state, medication, intoxication by drugs or alcohol etc. that affect the handwriting movement and the resulting writing.

(NIST HF)

3.1.223**interpretation**

Use of professional judgement to provide conclusions and/or opinions on hypothesis, based on findings and information gathered through the forensic process.

(ISO 21043-1:2018)

3.1.224**intra-comparison**

Comparison within one or more items purportedly from one source, to determine whether it was prepared by a single source.

3.1.225**irrelevant information**

Not pertinent or applicable to the subject, material, or question being considered. The consideration may be broad (i.e., discipline level) or specific (i.e., task level).

(NIST HF)

3.1.226**item**

[An] object, substance, or material that is collected, derived, or sampled as part of the forensic process.

(ISO 21043-1:2018)

3.1.227**knowledge, skills, and abilities****KSA**

The level of information, qualifications, and experience needed to perform assigned tasks.

Knowledge refers to acquired principles and practices related to a particular job; skills refer to acquired psychomotor behaviors; and abilities are talents, observable behaviors, or acquired dexterity.

3.1.228**known**

Of established origin associated with the matter under investigation.

(SWGDOC E01) (ASTM E1732)

3.1.229**known writing**

Of established origin used for comparison with questioned writing. Known writing may be collected or requested and can consist of exemplars or purported writing.

3.1.230**landscape mode**

A horizontal orientation of a document or image.

3.1.231**laser printer**

Nonimpact printer that uses a laser light source driven by digital signals to create images on a photoconductor (see [3.1.139 electrophotography](#)).

(ASTM F909)

3.1.232**leg**

A large appendage on the right side of such characters as “R” and “K”, usually formed with a downward movement

3.1.233**letterpress**

Relief printing using cast metal type, molded duplicate plates, or photo-polymer plates, which the imaged areas are raised above the non-printing areas, resulting in characters impressed into the substrate.

3.1.234**lift**

A product of an EDD examination. The developed image on the imaging film is preserved by applying fixing film to create a lift.

(ANSI/ASB Std 044)

3.1.235**liftoff**

The removal of one or more images of copy from the substrate by transferring to an intermediate member.

(ASTM F221)

3.1.236**liftoff correction**

The removal of a typed character by restriking with the same character while interposing an adhesive coated tape or sheet, thereby causing the imprinted character to adhere to the coating and be stripped from the record medium; then the intended character or space is placed therein.

3.1.237**ligature**

In printing or writing, two or three characters linked to create a single letterform such that the terminal stroke of the first is the initial stroke of the second.

**3.1.238****limitation**

A constraint to the examination, comparison, or opinion formation process (e.g., non-original documents, insufficient quantity or quality of material).

3.1.239**line continuity**

Uninterrupted writing. Discontinuity may be in the form of pen lifts, pen stops, hesitations, or patching.

3.1.240**line quality**

The appearance of the written stroke caused by the basic movements and the manner of manipulating the writing instrument. Results from the combination of such factors as speed, rhythm, shading, and smoothness of movement. It may vary from good line quality that is smooth and fluent to poor line quality that is tremulous and erratic.

3.1.241

line spacing

The distance between successive lines of text, which for machine-generated documents is usually measured from baseline to baseline.

3.1.242

Linear Sequential Unmasking

LSU

A procedure that specifies the optimal order in which forensic experts examine submitted documents in order to conduct a comparison.

3.1.243

liquid toner

Material composed of carbon particles or colorants suspended in a liquid carrier.
(SWGDOC E05)

3.1.244

lithography

The process of planographic printing in which the image to be printed is ink receptive/water repellent, and the non-image area is ink repellent/water receptive.

3.1.245

loop

A formation that curves and crosses itself.
(SWGDOC T01)

3.1.246

luminescence

The emission of radiant energy during a transition from an excited electronic state of an atom, molecule, or ion to a lower electronic state.
(ASTM E131)

3.1.247

manual typewriter

A typewriter whose operation depends solely upon the mechanical action powered by the operator.
(SWGDOC E04)

3.1.248

manuscript

(See [3.1.189 hand printing](#).)
(SWGDOC T01)

3.1.249

match between ink samples

The inability to distinguish between ink samples at a given level of analysis.
(SWGDOC M01)

3.1.250

match between samples

The inability to distinguish between two or more samples or items at a given level of analysis.
(SWGDOC M01)

3.1.251

medium

Substance(s) used to create an image or text.

3.1.252

mentor

One who provides complementary guidance and advice, not discipline-specific core training, to an examiner with limited experience in order to advance their professional development.

3.1.253

metadata

Information stored inside an electronic document or image that provides information which may include authorship, editing details, and the computer on which the document was created or modified.

3.1.254

metamers

(optical and instrumental examination, ink and paper)

Specimens differing in spectral reflectance but having colors that match in light of one spectral composition, when viewed by one observer, but may not match in light of other spectral compositions, or when viewed by another observer.
(ASTM E284)

3.1.255

model signature

A signature that is used as a prototype for a simulation or copy, by manual, electronic, or other means.

3.1.256

natural variation

Those deviations among repetitions of the same handwriting characteristic(s) that are normally demonstrated in the habits of a writer.

3.1.257

natural writing

Any specimen of writing executed without an attempt to control or alter its usual quality of execution.
(SWGDOC E01)

3.1.258**no conclusion**

An opinion expressed due to insufficiency of material, significantly limiting factors, or the presence of both similarities and dissimilarities (it may also be expressed as Inconclusive, Indeterminate or Insufficient). This is the zero point of the confidence scale.

NOTE In handwriting, this can be the presence of disguise in the questioned and/or known writing or a lack of comparable writing.

3.1.259**non-original**

Reproduction of a document, e.g., photocopied, faxed, scanned, photographed.
(NIST HF)

3.1.260**non-ballpoint pen ink**

Writing or marking media intended for use in a writing or marking instrument other than a ballpoint pen, including a dip or fountain pen, porous point pen, roller pen, marking instrument, etc. Typically, a thin, low viscosity ink with a water or solvent base (it may also be expressed as fluid pen ink).

3.1.261**nonimpact printer**

A printer in which image formation is not the result of mechanical impacts (e.g., thermal printer, electrostatic printer, electrophotographic printer, ink jet printer).

3.1.262**observation**

Recognizing and noting an occurrence.

3.1.263**observational drawing**

A visuomotor task in which visual information (an object, a photograph, handwriting) has to be translated into marks on the paper so that the copy ideally matches the original. Also known as sketching.

3.1.264**off-foot**

The lack of desired and optimum uniformity of contact between the typeface and the substrate. Also known as “off its feet”.
(SWGDOC E04)

**3.1.265****offset**

Press design in which an image is transferred from a plate to a rubber blanket that moves the image to the press sheet; offset principle allows plates to be right reading and generally gives a better-quality image than do direct transfers.

3.1.266**offset lithography**

A rotary planographic process, which yields a flat printed image, producing both the image and non-image areas of the plate chemically on one plane, creating the flat printing result. This process utilizes viscous inks based on a mixture of oils and/or resins, containing pigments and additives.

3.1.267**offsite technical training**

Information, knowledge, or training gained by interaction with or demonstration by pertinent manufacturers, businesses, and laboratories (e.g., paper mill, copier manufacturer) by going to a particular location away from the usual training or work site.

3.1.268**opacity**

The property of paper that prevents the transmission of light.
(SWGDOC M03)

3.1.269**open top**

A letter formation such as the handwritten “a” or “o” in which the top has not been closed.

3.1.270**opinion**

View, judgment, belief – a coherent, scientifically sound expression(s) that takes into consideration task-relevant information in addition to observations, data, calculations and interpretations.

3.1.271**original typed text**

Typed text imprinted onto the surface of a record medium as the result of the impact of a typeface striking directly or through a ribbon.
(SWGDOC E11)

3.1.272**originating document**

The document or other substrate with the handwriting, machine, or other markings that caused indentation(s) on a document(s) or other substrate beneath it (the recipient document).
(ANSI/ASB Std 044)

3.1.273**overprint correction**

The removal of a typed character from the text by restriking with the same character while interposing a tape or sheet coated with an opaque coating material, thereby causing the imprinted character to be covered by the coating.
(SWGDOC E11)

3.1.274**overspray**

Type of extraneous or undesirable ink dot(s) near the printed zones which originate from the printhead.

3.1.275

paper fiber impression

The imprint of a paper fiber in the ribbon substrate.
(SWGDOC E11)

3.1.276

parylene processing

The deposition of a clear polymer coating on a document(s) within a vacuum chamber to strengthen and stabilize the document(s).
(ASB 127-Draft)

3.1.277

patching

Retracing or retouching a portion of a written stroke.

3.1.278

payee perforator

An optional device on a check writer that perforates or shreds a pattern above the numeric impression region for the purpose of protecting the payee entry from alteration.
(SWGDOC E07)

3.1.279

pen emphasis

The act of forcing the pen against the paper surface with increased pressure. When the pen point has flexibility, this emphasis produces shading but with more rigid writing points such as ball point pens heavy pen emphasis can occur without any evidence of shading.

3.1.280

pen direction

The direction the pen moves to produce a character, connection, or signature.
(NIST HF)

3.1.281

pen lift

An interruption in a stroke caused by removing the writing instrument from the writing surface.

3.1.282

pen nib

The writing portion of a dip pen or fountain pen.

3.1.283

pen position

The relationship of the writing instrument to the writing surface.

3.1.284

pen pressure

The force with which the writing instrument contacts the paper.
(SWGDOC T01)

3.1.285**perforation**

A small hole or a group of small holes punched in a sheet of paper.

3.1.286**phosphorescence**

Any delayed emission of optical radiation which appears 10 ns or longer after the excitation.
(CIE S 017/E:2011 ILV)

3.1.287**photoluminescence**

Luminescence produced by the absorption of radiant flux; distinguished from ordinary reflection by a time delay and, usually, a shift toward longer wavelengths (see fluorescence and phosphorescence).
(CIE S 017/E:2011 ILV)

3.1.288**piezoelectric**

Ink jet technology where the electrically stimulated deformation of a crystal causes the expulsion of the droplets from the ink chamber.
(SWGDOC E06)

3.1.289**pitting**

Small defects in the surface of the photoreceptor that produce spots or voids on the printout.
(ASTM F1457)

3.1.290**pixel**

Small single-colored square display elements that comprise a bitmap.

3.1.291**pixilation**

A grainy or blurry effect caused by displaying a bitmap or a section of a bitmap at such a large size that individual pixels are visible.

3.1.292**pixels per inch****PPI**

The measure of resolution in a digital image or video display.

3.1.293**planchettes**

Small discs randomly distributed within the fibers or on the surface of security paper during the paper manufacturing process.

3.1.294**planographic printing**

A method in which the image and non-image areas of the printing plate are on the same plane.

3.1.295**platen**

A flat or rounded surface with a variety of functions in printing or manufacturing. It can be a flat metal (or earlier, wooden) plate pressed against a medium (such as paper) to cause an impression in letterpress printing. May also refer to a typewriter roller or the glass surface of a copier.

3.1.296**polyester film encapsulation**

A process whereby a document(s) or fragments of a document are sealed between two sheets of polyester film to preserve, stabilize, and facilitate handling.

3.1.297**portrait mode**

A vertical orientation of a document or image.

3.1.298**prefix**

The portion of the check writer impression located immediately to the left of the numeric value. (SWGDOC E07)

3.1.299**primary image**

The first instance in which an image is recorded onto any media that is a separate, identifiable object (for example, a digital image recorded on flash media). (SWGDOC D01)

3.1.300**primary indentation**

An impression on a document(s) or other substrate(s) beneath the originating document caused by the act of writing or other dynamic actions. (ANSI/ASB Std 044)

3.1.301**principal trainer**

Person with the primary responsibility for the training program administered to an individual.

3.1.302**printer**

Output device that produces a hardcopy record of data in the form of a sequence of discrete graphics belonging to a predetermined character or image set.

3.1.303**printer output area**

Maximum area on the page to which the printer will print. (ASTM F1457)

3.1.304**printhead**

Printing device of an ink jet or thermal printing system.

3.1.305

printing element

The parts of the total checkwriter impression that are not parts of the prefix which may encompass the currency type, decimal points, and commas.

(SWGDOC E07)

3.1.306

printing medium

A substance used to create an image, such as printing ink, toner, or wax.

3.1.307

printing module

Those components in the laser printer that together drive the laser scanner, create the image on the page, and deliver the page to the stacker.

3.1.308

processed image

Any image that has undergone enhancement, restoration, or other operation.

(SWGDOC D01)

3.1.309

proportions

Relative size of characters, elements of characters, or of words.

3.1.310

proportional spacing

A system of printing where the character spacing is set in accordance with the character width (see [3.1.161 fixed pitch](#)).

(SWGDOC E04)

3.1.311

proposition

Statement or assertion that is either true or false. Propositions represent two or more competing explanations for the evidence in the case at hand. As such, they are mutually exclusive, meaning they cannot be true at the same time.

3.1.312

purported writing

Known writing not witnessed by the forensic document examiner.

3.1.313

qualified sources

Organizations or individuals that provide, sponsor, or otherwise arrange for specific creditable training or instruction on forensic document examination or related topics. These sources support, either through reflection in their policies or by the individual presenting the training, the type of training and required minimum criteria provided in American National Standards.

3.1.314
questioned

Associated with the matter under investigation about which there is some dispute or query, including, but not limited to, whether two or more items have a common source.

3.1.315
questioned writing
also Q

Handwriting about which the authenticity or writership is in doubt.
(NIST HF)

3.1.316
rainbow printing

A printing technique that combines different color inks to produce a subtle transition between colors.

3.1.317
random error

A component of error whereby replicate measurements vary in an unpredictable way. Sources of random error are usually unexplained and therefore difficult to control.
(NIST HF)

3.1.318
randomly acquired characteristic
RAC

A feature or defect that can occur in the manufacturing process or from individual usage occurring after manufacture (for example, wear and damage defects such as cuts and gouges, reproducible blemishes, impression voids, improper and extraneous inking, or coincidental peripheral printing). The position, orientation, size and shape of these characteristics are essential to the determination of a specific device as the source of an impression.

3.1.319
range of variation (general and handwriting)

The accumulation of deviations among repetitions of respective handwriting characteristics that are typically demonstrated in the writing habits of an individual (see [3.1.415 variation](#)).

3.1.320
raster output scanner

Output peripheral, either stand alone or within a printer, that converts computer data into a bitmapped image, which is sent to the host for storage or a printer for output.

3.1.321
rebound

A double impression of a typed character, the second lighter than and overlapping the first.
(SWGDOC E04)

3.1.322**recipient document**

The document or other substrate that received indentations, other paper fiber disturbances, or other markings.

(ANSI/ASB Std 044)

3.1.323**record medium**

A piece of material, usually paper, on which an image or information is recorded.

3.1.324**reference collection**

An assemblage of established materials, substances, objects or artefacts of known properties or origin that may be used in the determination of the properties or origins of unknown items.

3.1.325**relevant information**

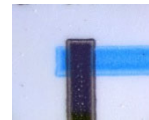
Pertinent and applicable to the subject, material, or question being considered; the consideration may be broad (i.e., discipline level) or specific (i.e., task level).

3.1.326**reliability**

Related to the degree of random error of the instrument/method, including the FDE, and which may be assessed through repeatability and reproducibility.

3.1.327**relief printing**

A method in which the image areas are above the non-image areas of the printing plate.

**3.1.328****repeatability**

A measure of reliability using the same FDE and the same instrument/method under exactly the same conditions to arrive at the same conclusion or result.

(NIST HF)

3.1.329**reproducibility**

A measure of reliability using different FDEs and/or differing conditions with the same measurement instrument/method to arrive at the same conclusion or result.

(NIST HF)

3.1.330**reproduction quality**

Extent to which a non-original document accurately replicates the features of the original document.

3.1.331
requested writing

Handwriting samples prepared by a particular person specifically for the purpose of comparison, usually to questioned material.

3.1.332
result

The product of the forensic service provider. This term is broad and may include observations, data, calculations, interpretations, findings, and opinions.

3.1.333
retouching

Adding handwritten lines or strokes in order to correct, improve, distort, or alter.

3.1.334
retrace

A stroke written over the preceding stroke, typically in reverse direction.



3.1.335
review, administrative

An assessment of the non-technical content associated with an examination and report.

NOTE This commonly includes, but may not be limited to, the verification of the presence of all documents listed in the request for examination and the report, the verification of the appropriate marking of all documents, the documentation of chain of custody, case notes, and typographical or other clerical errors.

3.1.336
review, technical

An assessment by another qualified forensic document examiner to review the method(s) and result(s) of the examiner of record to ensure the conclusion(s) rendered are supported.

NOTE A technical review commonly includes, but may not be limited to, the adequacy of technical notes, the verification of method(s) used, the determination of the adequacy or limitations of the evidence, the proper use of equipment, whether all pertinent examinations were performed, whether the findings are consistent with the observations noted/recorded during the examination, the applicable nature of any references, and documentation of the performance of the review.

3.1.337
ribbon shift

The movement of a multicolored inking ribbon allowing for a change in color to manifest itself in an impressed character.
(SWGDOC E07)

3.1.338
roller device

Wheel-type components designed to grab and transport paper into and through printers and copiers.

3.1.339**roller marks**

Visible or latent indented features in paper resulting from transport rollers in a printing or copying system.

3.1.340**rollerball pen**

A writing instrument that uses a tiny, revolving ball to dispense liquid ink onto paper. Gel and ballpoint pens use the same ball mechanism to deposit their ink but use gel- and oil-based ink, respectively.

3.1.341**rubber stamp**

(See [3.1.371 stamping device](#).)

3.1.342**sample**

Subset of a group (i.e., the totality of items under consideration) made up of one or more items (i.e., the individual parts into which that group is divided).

NOTE A group may be real and finite, real and infinite, or completely hypothetical.

3.1.343**satellites**

Extraneous or undesirable toner particles or ink droplets (see spatter, spray).

3.1.344**screen printing**

A method in which the image areas are on fine mesh screen through which ink can penetrate and the non-image areas are a stencil over the screen.

3.1.345**secondary indentation****secondary impression**

Fiber disturbance(s) not caused by the act of writing or other dynamic actions, rather caused by dynamic contact with the embossed side of an indentation(s) or other raised surface.

(ANSI/ASB Std 044)

3.1.346**set off**

The unintentional transfer of part of an image or ink from its intended location to another surface.

(ASTM F221)

3.1.347**shading**

Variations in the line width or density resulting from changes in the pressure of the writing instrument on the document; also associated with variations in pressure when using a split nib pen. Also referred to as stress.

3.1.348**side lighting**

Illumination from a light source at a low angle of incidence, or even parallel, to the surface of the item. Syn. *oblique lighting, grazing illumination, raking lighting*.

(ANSI/ASB Std 044)

3.1.349**signature style**

1. Text-based (all allographs legible),
2. Mixed style (two or more allographs are legible),
3. Stylized (one or no allographs are legible).

(NIST HF)

3.1.350**significant difference**

A feature that is structurally divergent between items or groups of items, is outside the observed range of variation of at least one of them, and that cannot be reasonably explained.

3.1.351**significant similarity**

A repeated distinguishing characteristic that is structurally similar between items or groups of items and is within their observed range of variation (e.g., consistent height ratio, consistent pen lift).

3.1.352**similarities**

A feature or characteristic observed in one item or group of items that is also observed in the same form in a comparable item or group of items.

3.1.353**simplistic writing**

Characterized by non-complex characters or strokes.

(NIST HF)

3.1.354**simulation**

An attempt to copy or reproduce handwriting (e.g., tracing, free hand, non-spurious).

3.1.355**single element typewriter**

A typewriter that generates text via interchangeable “elements” that each contain a full set of characters.

(SWGDOC E04)

3.1.356**single strike film ribbon**

An inked ribbon wherein the substrate is a plastic film material such as polyethylene, where each area of the ribbon is capable of producing only one image.

(ASTM F221)

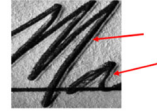
3.1.357**single strike paper ribbon**

An inked ribbon wherein the substrate is paper, where each area of the ribbon is capable of producing only one image.

(ASTM F221)

3.1.358**sister lines**

Sporadic inkless or partially inkless indented lines in a writing surface that are produced by the annular rim of a ball pen during the process of writing or making other markings, and which precisely run parallel to the primary ink line laid down by the ball pen.

**3.1.359****skill**

How well an individual is able to produce and repeat the formation of handwritten characters.

(NIST HF)

3.1.360**slant****slope**

The angle or inclination of the axis of letters relative to the baseline.

(NIST HF)

3.1.361**slit glass**

Alternate scanning surface found in some digital photocopiers used in conjunction with an automatic document feeder.

(SWGDOC E06)

3.1.362**smudge**

A handwritten or machine printed character smeared or streaked, unintentionally, onto an adjacent area.

3.1.363**source (of optical radiation)**

Object that produces light or other radiant flux.

(CIE S 017/E:2011 ILV)

3.1.364**spacing**

The distance between characters, words, or lines.

3.1.365**spatter**

Type of extraneous or undesirable ink droplet originating when a portion of an ink droplet strikes the intended area and is deflected to an unintended area.

(ASTM F1857)

3.1.366**spectroscopy**

The study of the absorption or emission of electromagnetic energy by a chemical species as a function of the energy incident upon that species; this analytical technique is used to identify elements and/or atomic and molecular structure by measurement of the radiant energy absorbed or emitted by a substance in any of the wavelengths of the electromagnetic spectrum.

3.1.367**specular reflection****regular reflection**

A mirror-like reflection of waves, such as light, that is reflected at a definite angle from a surface.

3.1.368**speed of execution**

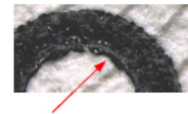
The swiftness with which a body of writing or signature is prepared. With the exception of some digitally captured writing, it cannot be measured precisely, but can be interpreted in broad terms such as slow, moderate, or rapid.

3.1.369**spur**

A small, angled appendage at the beginning or end of a stroke revealing an abrupt change of direction of the writing instrument. Also called hook or tick.

**3.1.370****squeegee effect**

The heavier concentration of ink on the edge of the ink line due to the ink being squeezed outward by the pressure used in the relief printing process.

**3.1.371****staff**

The vertical strokes of letters, such as "B", "T", and "P", that have a main stroke connecting to the baseline.

**3.1.372****standard**

(See [3.1.73 collected writing](#), [3.1.323 reference collection](#).)

3.1.373**stamping device**

A hand-marking device capable of making an inked impression using a variety of die materials that include, but are not limited to, vulcanized rubber, laserable rubber, photopolymer, gel, and metal.

Synonyms: hand stamp, self-inking stamp, pre-inked stamp, flat-die, cachet.

(ANSI/ASB Std 117)

3.1.374**stem – primary and secondary**

In typography, vertical or full-length angled strokes. Where there is a difference in the stroke thicknesses in printed characters with more than one stroke connecting to the baseline, the primary stem is thicker, and the secondary stem is thinner.



3.1.375
stochastic screening

An alternative to traditional halftone dots, this random-placement dot strategy uses frequency modulation (FM) to render enlarged images on large format printing devices. Unlike halftone, the dots are of a uniform size with darker areas having more dots packed closer together.

3.1.376
structural features

Characteristics relating to the construction of handwriting (e.g., number, position, order, and direction of strokes) (see [3.1.133 ductus](#)).

3.1.377
style (also design)

The general category of allograph (letter form) that is employed to execute writing, e.g., cursive or hand printing.
 (NIST HF)

3.1.378
submersion

The process of placing a document(s) into a liquid that is appropriate to facilitate cleaning, unfolding, or separating the document(s).

3.1.379
substrate

A material or surface that is written on, usually paper.

3.1.380
sufficient quantity (general)

The amount of material required to assess the distinguishing features of the questioned item(s) or known item(s).

3.1.381
sufficient quantity (handwriting)

The amount of writing required to assess the writer's distinguishing features and range of variation.

3.1.382
suitability

Sufficient quantity, quality, and complexity for comparison purposes.

3.1.383
systematic error

A component of error whereby replicate measurements remain constant or vary in a predictable way - for example an uncalibrated instrument would produce a constant systematic error.
 (NIST HF)

3.1.384
task-irrelevant information

Not pertinent or applicable to the subject, material, or question being considered. The consideration may be broad (i.e., case or discipline level) or specific (i.e., task level) (see [3.1.31 bias](#), [3.1.32 bias cognitive](#), [3.1.33 bias confirmation](#), [3.1.34 bias contextual](#)).

3.1.385**task-relevant information**

Pertinent and applicable to the subject, material, or question being considered. The consideration may be broad (i.e., case or discipline level) or specific (i.e., task level) (see [3.1.31 bias](#), [3.1.32 bias cognitive](#), [3.1.33 bias confirmation](#), [3.1.34 bias contextual](#)).

3.1.386**technical visit**

Travel for the purpose of obtaining information, knowledge, or training, including interaction with or demonstration by pertinent manufacturers, businesses, and laboratories.

(SWGDOC G02)

3.1.387**terminal stroke**

The final stroke of a character or word.

3.1.388**thermal imaging transfer ribbon**

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.

(ASTM F1623)

3.1.389**thermal impulse**

Ink jet technology where the rapid expansion of a bubble in the ink created by localized electrical heating expels the droplets from the ink chamber.

(SWGDOC E06)

3.1.390**thermal paper printing**

A non-impact method in which the image is formed by the action of heat on a treated substrate.

3.1.391**thermal print head**

Mechanism for printing with a temperature-sensitive substance; heat transfer is affected by touching heated pin tips to the material to cause a reaction.

3.1.392**thermal ribbon**

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.

3.1.393**thermal transfer printing**

A non-impact method in which the image is created by the action of a heated print head through a medium coated ribbon. This includes wax transfer, dye sublimation, and thermal fusion methods.

3.1.394**thermography**

A two-stage printing method in which a resinous powder adheres to wet ink. After heating, the compound rises to resemble raised or engraved printing.

3.1.395**thimble element**

An element used in an impact printing device in which the fully formed characters are located on the ends of finger-like devices that are similar to a daisy wheel except that the device is formed to produce a cup-like or thimble structure.

3.1.396**thread count (in typewriter/printer ribbons)**

The total number of horizontal and vertical threads per in.² of fabric.

3.1.397**tooth**

Quality of paper, or other writing surface that causes drag or resistance to the pen. A smooth, slick surface with no tooth can result in thick hairlines and lack of control in writing. Medium tooth causes just enough drag on the pen to facilitate control, produce fine hairlines and allow the writing process to be enjoyable and rhythmical. Too much tooth impedes ink flow and progress of the pen.

3.1.398**tracing**

Handwriting prepared by drawing the image of a genuine writing on a target document, which may be produced with the aid of carbon paper, transmitted light, or indented lines.

3.1.399**training**

The formal, structured process through which a person progresses from their current level of knowledge and expertise to the level of competency required to conduct specific tasks in accordance with American National Standards.

3.1.400**tram lines**

An accumulation of ink found on both sides of an ink line, typically caused by squeegee effect from a gel ink pen.

**3.1.401****transmitted lighting**

Illumination that passes through a document.
(ANSI/ASB Std 035)

3.1.402**tremor**

Shaky, irregular handwriting movements that are slowly executed or written by a person suffering from advanced age, nervousness, drug/alcohol influence, or physical/mental infirmities. These features can also be characteristic of unnaturally slow pen movements due to conscious attention to letterforms in deliberate drawings, rather than spontaneous writings.

**3.1.403
trough**

The lighter or non-inked furrow between the tram lines typically seen in gel pen writing.



**3.1.404
type of writing**

Refers to hand printing, cursive writing, numerals, symbols, or combinations thereof, and signatures.
(SWGDOC E01)

**3.1.405
type slug**

The block (usually metal) attached to the end of the typebar that bears the typeface.
(SWGDOC E04)

**3.1.406
typebar**

A bar, mounted on a typewriter, that holds a type slug(s).
(SWGDOC E04)

**3.1.407
typeface**

The portion of the element or type slug that projects from the body and contacts the surface of the substrate to form the character.
(SWGDOC E04)

**3.1.408
typeface defect**

Deviation from the intended appearance of a character due to physical damage to the typeface or its malformation in manufacture.
(SWGDOC E04)

**3.1.409
typestyle**

A particular variant of a type design.
(SWGDOC E04)

**3.1.410
typestyle classification scheme**

Hierarchical taxonomic schematic, key, or computer database that can be used to determine the source of a particular typestyle.
(SWGDOC E04)

NOTE These schemes are only an aid for searching a typestyle library and are not a substitute for actual reference materials in the typestyle library.

3.1.411**typestyle library**

An organized collection of reference samples of typestyles and related materials.
(SWGDOC E04)

NOTE Reference materials can also include information such as typestyle catalogs, treatises relative to typography and the design of typestyles used on typewriters and other printing systems, typewriters, type slugs, type elements, actual strike-ups, and instruction and repair manuals.

3.1.412**typewriter**

A self-contained machine for character-by-character direct writing by means of keyboard operated typefaces.
(SWGDOC E04)

3.1.413**typewriter grid****schneeberger grid**

A network of uniformly spaced horizontal and perpendicular lines, generally on a glass or acetate surface, used to check the alignment characteristics of typewriting or printing. The grids come in varying sizes and are physically placed on top of the document for measuring. Computer technology allows for these to be created in any spacing desired and overlaid on an image that has been imported into the computer.

3.1.414**ultraviolet****UV****ultraviolet radiation****UVR**

Radiation for which the wavelengths are shorter than those for visible radiation.

NOTE 1 The range between 100 nm and 400 nm is commonly subdivided into:

UV-A: 315 nm to 400 nm;

UV-B: 280 nm to 315 nm;

UV-C: 100 nm to 280 nm.

NOTE 2 A precise border between “ultraviolet” and “visible” cannot be defined, because visual sensation at wavelengths shorter than 400 nm is noted for very bright sources.

(CIE S 017/E:2011 ILV)

3.1.415**unaccustomed hand**

The opposite hand (or other body part) from that normally used for writing.
(SWGDOC T01)

3.1.416**unnatural writing**

A writing movement not typical in day-to-day writing that may be the result of intent, or internal/external factors. Some characteristics of unnatural writing movements include slow speed, poor line quality, poor line continuity with stops or hesitations in the pen line, and blunt commencement and termination strokes. This is often seen in disguised or simulated writing.

3.1.417**variation (handwriting)**

One or more forms (constructions) of a character or word in a naturally produced sample of handwriting. These deviations among repetitions of the same handwriting characteristic(s) are normally demonstrated in the habits of each writer.

3.1.418**variation (typewriters and printers)**

Imprecise duplication in multiple impressions from the same machine. The cause of this may be manifested due to wear and tear in a machine part(s).

3.1.419**verification**

The subsequent independent examination by another trained and competent examiner to either support or refute the conclusions of the original examiner. Verification for some laboratories may require that original items need to be examined.

3.1.420**visible radiation**

Any optical radiation capable of causing a visual sensation directly.

NOTE There are no precise limits for the spectral range of visible radiation since they depend upon the amount of radiant power reaching the retina and the responsivity of the observer. The lower limit is generally taken between 360 nm and 400 nm and the upper limit between 760 nm and 830 nm.

(CIE S 017/E:2011 ILV)

3.1.421**watermark**

A translucent design, pattern, or symbol created in paper by varying the opacity or distribution of fibers within an area of the paper to identify the manufacturer, brand, or customer. It is best seen when held up to light.

3.1.422**writer**

The individual who applies handwritten markings with a writing instrument on a substrate.

3.1.423**writing instrument**

Any tool used to create handwritten markings on a substrate. Typically used to describe the use of a pen, pencil, crayon, or other marker.

3.1.424**writing movement**

A pattern of the action of a writing instrument. These movements may be described garland, arcade, angular, or indeterminable.

3.1.425**writing surface**

The underlying plane on which the substrate, or the writing itself, is placed.

Annex A (informative)

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