

Forensic Document Examination Terms and Definitions

DRAFT



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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.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Forensic Document Examination Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Forensic Document Examination subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aaafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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

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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 (FDE) 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. This technical report may not cover every definition conceivably used by FDEs.

2 Normative References

There are no normative reference documents. See Annex A for bibliographical references.

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 accidental characteristic

One that falls outside of the writer's range of variation, and that would not be expected to be repeated in the writing because it may be an anomaly.

3.1.3 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)

3.1.3.1 analysis

The “unknown” item is classified according to its properties or characteristics. These properties can be directly observable, measurable, or inferred.
(based on Huber, 1959)

3.1.3.2**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)

3.1.3.3**evaluation**

The process of assessing similarities and dissimilarities in characteristics for the purposes of association or dissociation.

3.1.4**active coat**

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

3.1.5**aliasing**

The stair stepped or jagged effect resulting from analog to digital conversion (see [3.1.294 pixelation](#)).

3.1.6**alignment (handwriting)**

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

3.1.7**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)

3.1.8**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.

3.1.9**alignment defect**

A deviation from the intended appearance or position of a character relative to another character (see [3.1.207 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)

3.1.10**allograph**

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

3.1.11**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 Std 035)

3.1.12**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)

3.1.13**apex**

The uppermost point of a character.
(SWGDOC T01)

3.1.14**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.

3.1.15**apprenticeship**

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

3.1.16**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.

**3.1.17****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".

**3.1.18****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)

3.1.19**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.

3.1.20**ascender**

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

3.1.21**assisted hand signature**

A signature executed by a writer while the writer's hand, arm, or writing instrument is **supported**, steadied, or stabilized by another **resulting in a distorted signature**. (See [3.1.189 guided signature](#).)
(SWGDOC T01)

3.1.22**authorized document**

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

3.1.23**awkward hand**

(See [3.1.419 unaccustomed hand](#).)
(SWGDOC T01)

3.1.24**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)

**3.1.25****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)

3.1.26**ball terminal – typewriting**

Small round globe on some typefaces.

3.1.27**banding**

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

3.1.28**base**

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

3.1.29**baseline**

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

3.1.30**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)

3.1.31**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)

3.1.32**bias**

Any factor that has the potential of causing systematic deviation from any part of an evaluative process.

3.1.33**bias, cognitive**

A tendency for an individual's preexisting beliefs, expectations, motives, or the situational context to influence their sampling, observations, results, interpretations, or opinions, or their confidence in the aforementioned.

3.1.34**bias, confirmation**

The tendency to search for, collect, perceive, interpret information in a manner that supports preconceptions, expectations or desires.

NOTE This is a type of cognitive bias.

3.1.35**bias, contextual**

A tendency for exposure to or knowledge of case-specific information to affect the impartial collection, perception, or interpretation of evidence.

NOTE This is a type of cognitive bias.

3.1.36**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)

- 202 **3.1.37**
 203 **bleed**
 204 Ink feathering of one color into an adjacent color over time.
 205 (ASTM F1857)
- 206 **3.1.38**
 207 **blemish**
 208 A small extraneous spot found near inked regions of checkwriter impressions that is characteristic
 209 of machines that use ribbons as their ink source.
 210 (SWGDOC E07)
- 211 **3.1.39**
 212 **blunt ending**
 213 Effect on commencement and terminal strokes of letters, both uppercase and lowercase, by the
 214 application of the writing instrument to the paper prior to the beginning of any horizontal
 215 movement; an action that usually omits any beard, hitch, knob, or tick.
 216 (H & H Glossary)
- 217 **3.1.40**
 218 **boat**
 219 A dish-shaped figure consisting of a concave stroke and straight or curved stroke sometimes
 220 forming the base of letters.
- 221 **3.1.41**
 222 **bone folder**
 223 A piece of shaped bone or other material, such as plastic or Teflon, typically used by bookbinders to
 224 crease paper and to separate pieces of paper that are stuck together.
 225 (SWGDOC P01)
- 226 **3.1.42**
 227 **bowl**
 228 A curved stroke joining a stem that partially encloses an area forming an open cup-like shape.
- 229 **3.1.43**
 230 **buckle**
 231 The eyelet that is often used to form the middle of such letters as the cursive capital letters “K”, “R”,
 232 and “B”, where an element of a letter connects, abuts, or is closely adjacent to the staff.
- 233 **3.1.44**
 234 **bulletin**
 235 Type designs with a cap height greater than the height of the Roman type, usually used with a
 236 horizontal spacing of 3.5 mm or more per character or space (greater than or equal to 8 pitch).
- 237 **3.1.45**
 238 **cap**
 239 The uppermost element of letters such as the capital letters “F” and “T”.
- 240 **3.1.46**
 241 **caps height-typewriting**
 242 Height of a font’s uppercase letters, measured by the letter “H”.

- 243 **3.1.47**
 244 **carbon paper**
 245 A sheet composed of a supporting substrate on one or both sides of which is a coating containing a
 246 transferable (usually colored) material. The coating is of such nature that it will transfer in part or
 247 entirely to a copy sheet at the point of pressure contact.
 248 (ASTM F221)
- 249 **3.1.48**
 250 **case file**
 251 All case notes, correspondence provided by interested parties, images of submitted documents,
 252 billing and time sheets (where applicable), and any task-irrelevant information received. This file
 253 may be wholly or partially in an electronic format.
- 254 **3.1.49**
 255 **case notes**
 256 **examination notes**
 257 The record of procedures, standards, controls and instruments used, observations made, results of
 258 tests conducted, charts, graphs, images, audio, video, and other documentation generated during
 259 the examiner's analysis. This also includes any resulting findings, opinions, and conclusions.
- 260 **3.1.50**
 261 **certified reference material**
 262 **CRM**
 263 Reference material, accompanied by documentation issued by an authoritative body and providing
 264 one or more specified property values with associated uncertainties and traceabilities, using valid
 265 procedures.
 266 (JCGM 200:2012)
- 267 **3.1.51**
 268 **character**
 269 Any language symbol (for example, letter, numeral, punctuation mark, or other sign), other symbol,
 270 or ornament.
 271 (SWGDOC E01)
- 272 **3.1.52**
 273 **character pitch**
 274 The number of characters that can be printed in a horizontal 1 in. (25.4 mm).
 275 (ASTM F1457)
- 276 **3.1.53**
 277 **character spacing**
 278 **horizontal escapement**
 279 The width allotted to each character in a fixed pitch (monospacing) typewriter or to the basic unit
 280 in a proportional spacing typewriter; usually expressed in millimeters or as a fraction of an inch.
 281 (SWGDOC E04)
- 282 **3.1.54**
 283 **characteristic**
 284 A feature, quality, attribute, or property of an item.
 285 (SWGDOC E01)

- 286 **3.1.55**
 287 **characteristic, class**
 288 A feature determined prior to manufacture that is intended to be present in a particular form in
 289 every member of a group and can be used to define that group (e.g., a copybook style of writing, a
 290 specific type style, print process).
- 291 **3.1.56**
 292 **characteristic, common (handwriting)**
 293 A feature found in a similar, but not necessarily exact, form in the handwriting of individuals who
 294 are not members of a definable group and is not attributable to the study of a particular
 295 handwriting system.
- 296 **3.1.57**
 297 **characteristic, group (handwriting)**
 298 A feature found in a similar, but not necessarily exact, form in the handwriting of individuals who
 299 are members of a definable group and is not attributable to the study of a particular handwriting
 300 system.
- 301 **3.1.58**
 302 **characteristic, (individual, distinguishing) (non-handwriting)**
 303 A deviation from a class characteristic that would be present only by chance in another member of
 304 the class.
- 305 **3.1.59**
 306 **characteristic, (individual, distinguishing) (handwriting)**
 307 A feature found in handwriting that is not attributable to a class of writing and it is not taught. Only
 308 in combination would this characteristic(s) distinguish class from non-class.
- 309 **3.1.60**
 310 **characteristic, subclass (non-handwriting)**
 311 A feature, determined prior to manufacture, that is intended to be present in a particular form in
 312 every member of a sub-group within a class and can be used to define that sub-group.
- 313 **3.1.61**
 314 **characteristic, system (handwriting)**
 315 A feature found in an individual's handwriting that is attributable to the study of a particular
 316 handwriting system.
- 317 **3.1.62**
 318 **characteristic, transitory**
 319 A feature or defect that can be modified over time or removed entirely by use, cleaning,
 320 replacement, or repair.
- 321 **3.1.63**
 322 **charred documents**
 323 Items damaged by heat or fire.
 324 (SWGDOC P01)

3.1.64**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)

3.1.65**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)

3.1.66**circularity**

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

3.1.67**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.

3.1.68**closed loop**

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

3.1.69**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)

3.1.70**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)

3.1.71**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)

3.1.72**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.

3.1.73**collate**

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

3.1.74**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 undictated writing.

3.1.75**color-shifting ink**

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

3.1.76**common writership**

A document or group of documents that have been written by the same individual.

NOTE The term “common authorship” is sometimes used, but it is deprecated because authorship is becoming recognized as the originator of the words/ideas, as opposed to the physical writing of a document.

3.1.77**comparable (general)**

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

3.1.78**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)

3.1.79**competency**

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

3.1.80**complexity**

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

3.1.81**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.

3.1.82**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).

3.1.83**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).

3.1.84**connecting stroke**

A line joining two adjacent characters.
(SWGDOC T01)

3.1.85**connections**

The union of two characters e.g., in cursive writing.
(Modular Method)

3.1.86**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.

3.1.87**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)

3.1.88**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.

3.1.89**conventional printing**

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

3.1.90**copybook**

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

3.1.91**corona**

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

3.1.92**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.

3.1.93**correction media**

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

3.1.94**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".

3.1.95**counterfeit document**

A document that purports to be genuine but is not, because it has been falsely made or manufactured in its entirety.[18 USC 513 (c) (1)]

NOTE A counterfeit document is an attempt to create an exact copy of a document that exists (e.g., trying to recreate the US passport including all security features). A fabricated document is completely fictitious (e.g., creating a passport from a country that is fictitious). A forged document alters or changes a genuine document (e.g., altering the photo, name, or date on an existing passport).

3.1.96**coverup**

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

- 486 **3.1.97**
487 **coverup correction**
488 (See **3.1.275 overprint correction.**)
489 (SWGDOC E11)
- 490 **3.1.98**
491 **cracking**
492 Condition in which ink that has been absorbed into a substrate causes the coating to shrink to a
493 state much smaller than the original coating dimension causing fractures in the image area.
494 (SWGDOC E06-13)
- 495 **3.1.99**
496 **cross mark**
497 Usually an “x” used as a signature and, if witnessed, may be legally binding. Also known as “His
498 Mark”.
- 499 **3.1.100**
500 **cross stroke**
501 A stroke that crosses another portion of the character and is not attached at either end (for
502 example, the horizontal stroke of the “t”) (see **3.1.101 crossbar**).
503 (SWGDOC T01)
- 504 **3.1.101**
505 **crossbar**
506 A stroke that intersects other portions of the character at both ends (see **3.1.17 arm** and **3.1.100**
507 **cross stroke**).
508 (SWGDOC T01)
- 509 **3.1.102**
510 **crystallization**
511 Condition in which ink evaporates and forms crystals.
512 (SWGDOC E06-13)
- 513 **3.1.103**
514 **cursive**
515 A type of writing in which the letters are joined and the writing instrument is not lifted after most
516 strokes.
517 (SWGDOC T01)
- 518 **3.1.104**
519 **daisy wheel element**
520 **print wheel**
521 An element used in typewriters or computer printers in which the fully formed characters are
522 contained on the ends of fingerlike projections radiating out from the center of a disk.
523 (SWGDOC E04-13)

3.1.105**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.

3.1.106**descender**

A stroke that extends below the baseline of the body of the letter formation.
(SWGDOC T01)

3.1.107**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.

3.1.108**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

3.1.109**diagonal stroke**

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

3.1.110**dichroic filters**

A filter with two transmission bands. These bands are usually widely separated, and can be of significantly different size.
(SWGDOC M01)

3.1.111**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)

3.1.112**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.

- 566 **3.1.113**
 567 **diffuse reflection**
 568 Diffusion by reflection in which, on the macroscopic scale, there is no regular reflection.
 569 (CIE S 017/E:2011 ILV)
- 570 **3.1.114**
 571 **digital image**
 572 An image that is represented by discrete numerical values organized in a two-dimensional array;
 573 when viewed on a monitor, projected image or printed on paper, it appears similar to a photograph.
 574 (SWGIT/SWGDE)
- 575 **3.1.115**
 576 **digital image processing**
 577 Any activity that transforms a digital image.
 578 (SWGDOC E03) (ANSI/ASB Std 035)
- 579 **3.1.116**
 580 **digital printing**
 581 A method of printing from a digital-based image directly to a variety of media.
- 582 **3.1.117**
 583 **digital signature**
 584 An electronic signature that includes an authentication scheme, such as through the use of public
 585 key encryption cryptography.
- 586 **3.1.118**
 587 **digitally captured signature**
 588 **DCS**
 589 The data produced from the capturing of the physical properties of the movement of a handwritten
 590 signature in the act, also known as Electronically Captured Signatures, Electronic Handwritten
 591 Signature, Biometric Signature.
 592
 593 NOTE While a digitally captured signature is one kind of an **electronic signature**, it is not synonymous with
 594 **digital signature, electronic signature, or eSignature.**
- 595 **3.1.119**
 596 **direct contact**
 597 Two sheets of paper, one on top of the other, with no intervening sheets.
 598 (SWGDOC E02)
- 599 **3.1.120**
 600 **direct thermal product**
 601 Substrate coated with a heat sensitive formulation for the purpose of creating an image when heat
 602 is applied from a thermal printhead.
 603 (ASTM F1623).
- 604 **3.1.121**
 605 **directional change**
 606 A modification in the progress of the written line; such changes can occur as gradual curves, abrupt
 607 angles, or curves and retracings.

3.1.122**directional skipping**

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

3.1.123**disguised writing**

Deliberately altered in an attempt to hide normal writing habits.

NOTE This is a type of distorted writing and determining the intent between the two remains with the trier of fact.

(Modular Method)

3.1.124**dissimilarity**

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

3.1.125**distorted writing**

Writing that 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, SWGDOC E01)

3.1.126**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 in-person training, but is used to complement that training.

3.1.127**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)

3.1.128**dot matrix**

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

- 647 **3.1.129**
 648 **downstroke**
 649 The part of a letter that is made when the writing instrument is moving from the top to the bottom
 650 of a letter.
- 651 **3.1.130**
 652 **drag line**
 653 **drag stroke**
 654 **hairline (handwriting)**
 655 A stroke resulting from incomplete lifting of the pen, usually faint in ink coverage. Also, a very thin
 656 or light stroke of a writing instrument in areas where its movement is not normally recorded.
- 657 **3.1.131**
 658 **drop on demand**
 659 Ink jet technology where drops are generated as needed to create an image.
 660 (SWGDOC E06)
- 661 **3.1.132**
 662 **dry letter transfer process**
 663 Plastic lettering on specially prepared paper which can be transferred to a substrate by the
 664 application of pressure.
- 665 **3.1.133**
 666 **dry seal**
 667 A non-inked mechanical device which embosses a design on paper.
 668 (SWGDOC E08)
- 669 **3.1.134**
 670 **dry toner**
 671 Material in a dry developer system which when deposited on a substrate by the field of an
 672 electrostatic charge pattern, becomes the visible record.
 673 (SWGDOC E05)
- 674 **3.1.135**
 675 **dual component development**
 676 Mixture of dry toner and iron oxide developer that is used for developing electrostatic images in
 677 copiers.
 678 (SWGDOC E05)
- 679 **3.1.136**
 680 **ductus**
 681 The direction, sequencing, and speed with which the strokes making up a character are executed.
- 682 **3.1.137**
 683 **dye diffusion thermal transfer**
 684 **dye sublimation**
 685 An imaging process that uses thermal dye ribbons with selected organic dyes, the imaging
 686 characteristics of which are different from the pigmented materials used in thermal transfer wax
 687 ribbons.

- 688 **3.1.138**
 689 **electric typewriter**
 690 A typewriter in which an electromechanical device causes the type element to be activated when
 691 the keys are struck.
 692 (ASTM F909)
- 693 **3.1.139**
 694 **electromagnetic radiation**
 695 Emission or transfer of energy in the form of electromagnetic waves with the associated photons.
- 696 NOTE The French term “radiation” applies preferably to a single element of any radiation, characterized by
 697 one wavelength or one frequency.
 698 (CIE S 017/E:2021 ILV)
- 699 **3.1.140**
 700 **electronic document**
 701 Text, image files, spreadsheets, or other documents generated by computer on any media or device
 702 for any electronic processing. Electronically stored documents follow no format or readability
 703 requirements except when retrieved for human-use.
- 704 **3.1.141**
 705 **electronic signature**
 706 **eSignature**
 707 Digital data embedded in a digital file for the purposes of authentication, which may consist of a
 708 password, a photo, biometric data (DCS, fingerprint, etc.), One-Time-Passwords, voice recording, etc.
- 709 **3.1.142**
 710 **electronic typewriter**
 711 An electric typewriter in which the keyboard input is received by an electronic processor built into
 712 the typewriter. This unit then controls the print head and other features to produce the typing
 713 action.
 714 (ASTM F909)
- 715 **3.1.143**
 716 **electrophotography**
 717 A non-impact printing process in which the image is formed using photoconductive paper or a
 718 photoconductive intermediate drum.
- 719 **3.1.144**
 720 **electrostatic detection device**
 721 **EDD**
 722 An instrument that uses an electrostatic charge along with toner distribution as the mechanism to
 723 visualize paper fiber disturbances (for example, indentations and erasures).
 724 (ANSI/ASB Std 044)
- 725 **3.1.145**
 726 **element**
 727 The interchangeable typeface carrier of a single element typewriter. See [3.1.24 ball element](#),
 728 [3.1.104 daisy wheel element](#), [3.1.399 thimble element](#).
 729 (SWGDOC E04-13)

- 730 **3.1.146**
731 **embellishments**
732 Flourishes, ornaments, paraphs, rubrics and underscores. It adds or extends strokes that are easily
733 executed and are not essential to the recognition of the character or the word.
734 (NIST HF)
- 735 **3.1.147**
736 **embossment variation**
737 Nonuniformity of the dry seal impression on the paper stock. It can be caused by the manner of
738 application or by defects in the dry seal.
739 (SWGDOC E08)
- 740 **3.1.148**
741 **emission (of radiation)**
742 Release of radiant energy.
743 (CIE S 017/E:2011 ILV)
- 744 **3.1.149**
745 **empty magnification**
746 Occurs when the image continues to be enlarged, but no additional detail is resolved.
- 747 **3.1.150**
748 **enhancement**
749 A process to reveal, intensify, magnify, or clarify an observation. Image enhancement is the process
750 of adjusting a digital image, making it more suitable for display or further image analysis. For
751 example, sharpening or brightening an image.
- 752 **3.1.151**
753 **erasure**
754 The area where material has been removed from a document by chemical, abrasive, or other means.
755 (SWGDOC E03) (ANSI/ASB 035)
- 756 **3.1.152**
757 **evidence**
758 (See [3.1.229](#) item.)
- 759 **3.1.153**
760 **examination**
761 The process of observing, searching, detecting, recording, prioritizing, collecting, analyzing,
762 measuring, comparing and/or interpreting.
- 763 **3.1.154**
764 **excitation**
765 Elevation of the energy levels of atoms, molecules or ions to higher energy levels.
766 (CIE S 017/E:2011 ILV)

- 767 **3.1.155**
 768 **exclusion**
 769 **elimination**
 770 The determination that there are sufficient characteristics in disagreement, with no significant
 771 limitations, to support an opinion that two or more items did not originate from the same source.
- 772 **3.1.156**
 773 **exemplars**
 774 Samples of handwriting, printed text, paper, ink, etc., known (or purported) to have been produced
 775 by a particular individual, machine, or manufacturer.
- 776 **3.1.157**
 777 **external (extrinsic) factors (handwriting)**
 778 Writing conditions such as underlying writing surface, substrate, writing implement, writing
 779 position, interruptions during the writing activity etc. that affect the handwriting movement or the
 780 resulting writing.
 781 (NIST HF)
- 782 **3.1.158**
 783 **eyelet**
 784 Often found in cursive writing, a small oval or loop formation.
- 785 **3.1.159**
 786 **fabric ribbon**
 787 An inked ribbon wherein the substrate is a woven cloth material, such as nylon, cotton, or silk.
- 788 **3.1.160**
 789 **fabricated document (fictitious instrument)**
 790 A falsely manufactured document.
- 791 NOTE A counterfeit document is an attempt to create an exact copy of a document that exists (e.g., trying to
 792 recreate the US passport including all security features). A fabricated document is completely fictitious (e.g.,
 793 creating a passport from a country that is fictitious). A forged document alters or changes a genuine
 794 document (e.g., altering the photo, name, or date on an existing passport).
- 795 **3.1.161**
 796 **family (of type)**
 797 A class of type designs sharing basic qualities of style and artistic expression that differentiate it
 798 from other similar designs.
 799 (SWGDOC E04)
- 800 **3.1.162**
 801 **feathering**
 802 The condition in which the writing/printing fluid spreads laterally in a pattern that usually follows
 803 the direction of the surface fibers away from the written or printed line.
- 804 **3.1.163**
 805 **financial document**
 806 An obligation, security, or other document representative of value made or issued by or under the
 807 authority of a governmental or private organization.

808	3.1.164
809	finding
810	Information concluded as a result of an examination.
811	(ISO 21043-1:2018)
812	3.1.165
813	fixed pitch
814	Describes a character set in which all character cells are of equal width (see proportional spacing).
815	(ASTM F1457)
816	3.1.166
817	fixing film
818	Clear plastic sheet with a pressure sensitive adhesive layer.
819	(ANSI/ASB Std 044)
820	3.1.167
821	flashing
822	Excess material from a molding process.
823	(SWGDOC E04)
824	3.1.168
825	flexography
826	A form of relief printing like letterpress, but using a flexible rubber or resilient photopolymer relief
827	plate(s).
828	3.1.169
829	flourish
830	A writing movement that is designed to be ornamental.
831	3.1.170
832	flow back
833	An increase in the density of the ink line caused by excess ink running back onto the previous
834	portion of a stroke, occurring as the pen is lifted from the paper.
835	3.1.171
836	fluorescence
837	A process by which radiant flux of certain wavelengths is absorbed and reradiated nonthermally at
838	other, usually longer, wavelengths.
839	(ANSI/ASB Std 035)
840	3.1.172
841	foil stamping
842	Various colored foils made of metals or other materials which are typically combined with
843	embossing or debossing, carried on a plastic sheet, and transferred through a stamping or heated
844	die process on to a substrate.

- 845 **3.1.173**
 846 **forensic document examiner**
 847 **FDE**
 848 A forensic service provider who addresses inquiries that arise in matters where the authenticity,
 849 genuineness, or source of a document is questioned, and does not provide personality assessment,
 850 creation of a personality profile, or analysis, or judgment of a writer's personality or character.
- 851 **3.1.174**
 852 **forensic science**
 853 The application of scientific principles and techniques to matters of the law especially as relating to
 854 the collection, examination, and analysis of physical evidence.
- 855 **3.1.175**
 856 **forensic science practitioner**
 857 An individual who (1) applies scientific or technical practices to the recognition, collection, analysis,
 858 or interpretation of evidence at issue in criminal, civil, or administrative investigations and
 859 proceedings, and (2) issues test results, provides reports, or provides interpretations, conclusions,
 860 or opinions through testimony with respect to such evidence.
- 861 **3.1.176**
 862 **forged document**
 863 A document that purports to be genuine but is not, because it has been falsely altered, completed,
 864 signed, or endorsed, or contains a false addition thereto or insertion therein, or is a combination of
 865 parts of two or more genuine documents.
 866 [18 USC 513 (c) (2)]
 867
 868 NOTE A counterfeit document is an attempt to create an exact copy of a document that exists (e.g., trying to
 869 recreate the US passport including all security features). A fabricated document is completely fictitious (e.g.,
 870 creating a passport from a country that is fictitious). A forged document alters or changes a genuine
 871 document (e.g., altering the photo, name, or date on an existing passport).
- 872 **3.1.177**
 873 **fracture pattern**
 874 The spatial arrangement of each complementary edge formation created when a single object is
 875 separated into two or more fragments.
 876 (SWGDOC E11)
- 877 **3.1.178**
 878 **fugitive ink**
 879 An ink that will run and/or stain when it comes in contact with water or any aqueous type of
 880 solution.
- 881 **3.1.179**
 882 **full color copier/printer**
 883 Office machines that can reproduce color originals containing gradations of color (see [3.1.234 laser](#)
 884 [printer](#), [3.1.219 ink jet process](#)).
- 885 **3.1.180**
 886 **fuser roll**
 887 Heated roller that contacts the paper and toner directly and is part of the fuser unit.
 888 (ASTM F1434)

889 **3.1.181**890 **garland**

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

894 **3.1.182**895 **gel pen ink**

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

898 **3.1.183**899 **glyphs**

900 The shapes that characters can have when they are rendered or displayed. In contrast to characters,
 901 glyphs appear on the screen or paper as particular representations of one or more characters. A
 902 repertoire of glyphs makes up a font.
 903 (Unicode 12.0.0, 2.2)

904 **3.1.184**905 **gooping**

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

908 **3.1.185**909 **gravure**

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

912 **3.1.186**913 **ground truth**

914 Information that is known to be real or true, provided by direct observation and measurement (i.e.,
 915 empirical evidence) as opposed to information provided by inference.

916 **3.1.187**917 **gripper bar**918 **picker bar**

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

921 **3.1.188**922 **gripper marks**

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

925 **3.1.189**926 **guided signature**

927 A signature executed while an impaired writer's hand, arm, or writing instrument is controlled by
 928 another resulting in a distorted signature. See assisted hand signature.

- 929 **3.1.190**
 930 **guidelines**
 931 Lines that show a route to follow when simulating handwriting or signatures. These can exist in the
 932 form of pencil lines or indentations or be created by the use of transmitted light shone through a
 933 document containing the entries to be copied.
 934 (NIST HF)
- 935 **3.1.191**
 936 **hairline (typography)**
 937 The thinnest line found in a specific typeface that consists of lines of varying widths, usually
 938 common to serif typefaces.
- 939 **3.1.192**
 940 **halftone**
 941 Print process in which a series of dots of variable diameter and regular interdot spacing is used to
 942 print photographs and drawings.
- 943 **3.1.193**
 944 **hand printing**
 945 A style of writing in which the letters are not joined and the writing instrument is lifted after most
 946 strokes.
 947 (SWGDOC T01)
- 948 **3.1.194**
 949 **handwriting**
 950 Writing in any form (such as cursive, hand printing, signatures, numbers). Although “handwriting,”
 951 is used as a general term, it may be produced by the hand, mouth, foot, or other body part by
 952 directly manipulating a writing instrument.
- 953 **3.1.195**
 954 **hesitation**
 955 A pause in the writing without the instrument being lifted.
 956 (SWGDOC T01)
- 957 **3.1.196**
 958 **hiatus**
 959 In cursive writing, a space caused by lifting the writing instrument at the conclusion of
 960 one letter, followed by the reapplication of the instrument to begin the next letter of a
 961 word; also referred to as a break or pen lift. May be an individualized habit.
- 962 **3.1.197**
 963 **identification document**
 964 Made or issued by or under the authority of a governmental or private organization which, when
 965 completed with information concerning a particular individual, is of a type intended or commonly
 966 accepted for the purpose of identification of individuals.
- 967 **3.1.198**
 968 **image**
 969 A visually observable counterpart of an object produced by means of imaging technology.
 970 (SWGDOC D01)



971	3.1.199
972	image area
973	That portion of the page that is printed, including the space between letters and lines.
974	(ASTM F1457)
975	3.1.200
976	image enhancement
977	Any process intended to improve the visual appearance of an image or specific features within an
978	image.
979	(ASTM E2916)
980	3.1.201
981	image formation
982	The elements that comprise an image to include, but not limited to, continuous inked areas, halftone
983	patterns, and dot characteristics.
984	3.1.202
985	image density
986	Contrast between image and background as measured by densitometer.
987	(ASTM F221)
988	3.1.203
989	imaging drum
990	Photoreceptive drum coated with a charge-sensitive material used in the image transfer systems of
991	toner devices.
992	(SWGDOC E05)
993	3.1.204
994	imaging film
995	Thin transparent plastic material that covers the item during an examination using an EDD.
996	(ANSI/ASB Std 044)
997	3.1.205
998	impact printer
999	A printer in which printing is the result of mechanical impacts (e.g., dot-matrix, typewheel printer).
1000	(SWGDOC E04)
1001	3.1.206
1002	impression
1003	An image formed by pressure.
1004	(SWGDOC E11)
1005	3.1.207
1006	impression defect
1007	A deviation from the intended evenness in appearance of a character over the entire impression of
1008	the character or relative to the impression of another character (see 3.1.266 off-foot).
1009	(SWGDOC E04).

1010	3.1.208
1011	impression format
1012	The manner in which the paper is embossed or shredded.
1013	(SWGDOC E07)
1014	3.1.209
1015	inconclusive opinion
1016	An opinion expressed when an examination has been undertaken, but the FDE is unable to make a
1017	determination with regard to writership or source, for example because of the presence of both
1018	similarities and dissimilarities.
1019	3.1.210
1020	indentations
1021	Latent or visible impressions and/or embossments in paper or other media. This also includes
1022	paper fiber disturbances which do not optically appear as impressions.
1023	(ASB S044-19)
1024	3.1.211
1025	indigo printing
1026	Created directly from digital data, charged ink particles are applied to an imaging drum and then
1027	transferred to a print blanket.
1028	3.1.212
1029	indirect contact
1030	Two sheets of paper, one on top of the other, with one or more intervening sheets.
1031	(SWGDOC E02)
1032	3.1.213
1033	individual prefix
1034	A prefix especially designed for a particular customer.
1035	(SWGDOC E07)
1036	3.1.214
1037	individualizing characteristics
1038	discriminating characteristics
1039	Marks or properties that serve to characterize an item(s) and distinguish it from similar item(s).
1040	3.1.215
1041	infrared
1042	IR
1043	Referring to radiant flux having wavelengths longer than the wavelengths of visible light, usually
1044	from ~700 nm to 1400 nm (~0.7 µm to 1.4 µm) as per the International Commission on
1045	Illumination (CIE) for IR-A.
1046	(ANSI/ASB Std 035)

1047	3.1.216
1048	infrared luminescence
1049	IRL
1050	The emission of radiant energy during a transition from an excited electronic state of an atom,
1051	molecule, or ion to a lower electronic state (fluorescence or phosphorescence, or both), where the
1052	spectrum of the excitation source is in the ultraviolet (UV) or visible region of the electromagnetic
1053	spectrum, or both, and the spectrum of the emitted energy is in the far red or infrared (IR) region of
1054	the electromagnetic spectrum.
1055	(ANSI/ASB Std 035)
1056	3.1.217
1057	initial stroke
1058	Written movement at the beginning of a character. (Also known as beginning or commencement
1059	stroke.)
1060	3.1.218
1061	ink formula
1062	A precise recipe or set of ingredients and their quantities that the manufacturer specifies for the
1063	final ink product. These ingredients are colorants (dyes and pigments) and components (volatile
1064	solvents, resins, etc.).
1065	(SWGDOC M01)
1066	3.1.219
1067	ink jet process
1068	A non-impact printing method in which the image is formed by projecting droplets of a liquid or
1069	solid printing medium onto a substrate.
1070	3.1.220
1071	ink library
1072	An organized collection of reference samples of inks and related materials.
1073	(SWGDOC M02)
1074	3.1.221
1075	inked ribbon
1076	A ribbon composed of a supporting substrate of film, fabric, or paper and a coating or impregnation
1077	of a coloring material. The coloring material is of such nature that it will transfer in part or entirely
1078	to a copy sheet at the point of pressure contact.
1079	(ASTM F221)
1080	3.1.222
1081	insufficient
1082	A determination made by an FDE that the material to be examined does not contain enough
1083	information for an examination to be conducted. This may be due to the amount, complexity,
1084	comparability, or line, reproduction or writing quality of the material. In many instances, FDEs
1085	report an inconclusive opinion, explaining limitations/insufficiency, rather than reporting an
1086	insufficient opinion.
1087	(NIST HF)

1088	3.1.223
1089	intaglio printing
1090	Process in which the image areas are below the non-image areas of the plate, resulting in raised
1091	printing on the substrate.
1092	3.1.224
1093	inter-comparison
1094	Comparison between two or more items to determine whether or not they share a common source.
1095	3.1.225
1096	internal (intrinsic) factors
1097	Conditions such as age, illness, disease, fatigue, emotional state, medication, intoxication by drugs
1098	or alcohol etc. that affect the handwriting movement and the resulting writing.
1099	(NIST HF)
1100	3.1.226
1101	interpretation
1102	Use of professional judgement to provide conclusions and/or opinions on hypothesis, based on
1103	findings and information gathered through the forensic process.
1104	(ISO 21043-1:2018)
1105	3.1.227
1106	intra-comparison
1107	Comparison within one or more items purportedly from one source, to determine whether it was
1108	prepared by a single source [see common writership (authorship)].
1109	3.1.228
1110	irrelevant information
1111	Not pertinent or applicable to the subject, material, or question being considered. The consideration
1112	may be broad (i.e., discipline level) or specific (i.e., task level).
1113	(NIST HF)
1114	3.1.229
1115	item
1116	[An] object, substance, or material that is collected, derived, or sampled as part of the forensic
1117	process.
1118	(ISO 21043-1:2018)
1119	3.1.230
1120	knowledge, skills, and abilities
1121	KSA
1122	The level of information, qualifications, and experience needed to perform assigned tasks.
1123	Knowledge refers to acquired principles and practices related to a particular job; skills refer to
1124	acquired psychomotor behaviors; and abilities are talents, observable behaviors, or acquired
1125	dexterity.
1126	3.1.231
1127	known
1128	Of established origin associated with the matter under investigation.
1129	(SWGDOC E01) (ASTM E1732)

- 1130 **3.1.232**
 1131 **known writing**
 1132 Of established origin used for comparison with questioned writing. Known writing may be collected
 1133 or requested and can consist of exemplars or purported writing.
- 1134 **3.1.233**
 1135 **landscape mode**
 1136 A horizontal orientation of a document or image.
- 1137 **3.1.234**
 1138 **laser printer**
 1139 Nonimpact printer that uses a laser light source driven by digital signals to create images on a
 1140 photoconductor (see **3.1.143 electrophotography**).
 1141 (ASTM F909)
- 1142 **3.1.235**
 1143 **leg**
 1144 A large appendage typically on the right side of such characters as “R” and “K”, usually formed with a
 1145 downward movement.
- 1146 **3.1.236**
 1147 **letterpress**
 1148 Relief printing using cast metal type, molded duplicate plates, or photo-polymer plates, which the
 1149 imaged areas are raised above the non-printing areas, resulting in characters impressed into the
 1150 substrate.
- 1151 **3.1.237**
 1152 **lift**
 1153 A product of an EDD examination. The developed image on the imaging film is preserved by
 1154 applying fixing film to create a lift.
 1155 (ANSI/ASB Std 044)
- 1156 **3.1.238**
 1157 **liftoff**
 1158 The removal of one or more images of copy from the substrate by transferring to an intermediate
 1159 member.
 1160 (ASTM F221)
- 1161 **3.1.239**
 1162 **liftoff correction**
 1163 The removal of a typed character by restriking with the same character while interposing an
 1164 adhesive coated tape or sheet, thereby causing the imprinted character to adhere to the coating and
 1165 be stripped from the record medium; then the intended character or space is placed therein.
- 1166 **3.1.240**
 1167 **ligature**
 1168 In printing or writing, two or three characters linked to create a single letterform such
 1169 that the terminal stroke of the first is the initial stroke of the second.



1170	3.1.241
1171	limitation
1172	A constraint to the examination, comparison, or opinion formation process (e.g., non-original
1173	documents, insufficient quantity or quality of material).
1174	3.1.242
1175	line continuity
1176	Uninterrupted writing. Discontinuity may be in the form of pen lifts, pen stops, hesitations, or
1177	patching.
1178	3.1.243
1179	line quality
1180	The appearance of the written stroke caused by the basic movements and the manner of
1181	manipulating the writing instrument. Results from the combination of such factors as speed,
1182	rhythm, shading, and smoothness of movement. It may vary from good line quality that is smooth
1183	and fluent to poor line quality that is tremulous and erratic.
1184	3.1.244
1185	line spacing
1186	The distance between successive lines of text, which for machine-generated documents is usually
1187	measured from baseline to baseline.
1188	3.1.245
1189	Linear Sequential Unmasking
1190	LSU
1191	A procedure that specifies the optimal order in which forensic experts examine submitted
1192	documents in order to conduct a comparison and minimize the risk of bias.
1193	3.1.246
1194	liquid toner
1195	Material composed of carbon particles or colorants suspended in a liquid carrier.
1196	(SWGDOC E05)
1197	3.1.247
1198	lithography
1199	The process of planographic printing in which the image to be printed is ink receptive/water
1200	repellent, and the non-image area is ink repellent/water receptive.
1201	3.1.248
1202	loop
1203	A formation that curves and crosses itself.
1204	(SWGDOC T01)
1205	3.1.249
1206	luminescence
1207	The emission of radiant energy during a transition from an excited electronic state of an atom,
1208	molecule, or ion to a lower electronic state.
1209	(ASTM E131)

1210	3.1.250
1211	manual typewriter
1212	A typewriter whose operation depends solely upon the mechanical action powered by the operator.
1213	(SWGDOC E04)
1214	3.1.251
1215	manuscript
1216	(See 3.1.193 hand printing .)
1217	(SWGDOC T01)
1218	3.1.252
1219	match between ink samples
1220	The inability to distinguish between ink samples at a given level of analysis.
1221	(SWGDOC M01)
1222	3.1.253
1223	match between samples
1224	The inability to distinguish between two or more samples or items at a given level of analysis.
1225	(SWGDOC M01)
1226	3.1.254
1227	medium
1228	Substance(s) used to create an image or text.
1229	3.1.255
1230	metadata
1231	Information stored inside an electronic document or image that provides information which may
1232	include authorship, editing details, and the computer on which the document was created or
1233	modified.
1234	3.1.256
1235	metamers
1236	(optical and instrumental examination, ink and paper)
1237	Specimens differing in spectral reflectance but having colors that match in light of one spectral
1238	composition, when viewed by one observer, but may not match in light of other spectral
1239	compositions, or when viewed by another observer.
1240	(ASTM E284)
1241	3.1.257
1242	model signature
1243	A signature that is used as a prototype for a simulation or copy, by manual, electronic, or other
1244	means.
1245	3.1.258
1246	natural variation
1247	Those deviations among repetitions of the same handwriting characteristic(s) that are normally
1248	demonstrated in the habits of a writer.

- 1249 **3.1.259**
 1250 **natural writing**
 1251 Any specimen of writing executed without an attempt to control or alter its usual quality of
 1252 execution.
 1253 (SWGDOC E01)
- 1254 **3.1.260**
 1255 **no conclusion**
 1256 An opinion expressed due to insufficiency of material, significantly limiting factors, or the presence
 1257 of both similarities and dissimilarities (it may also be expressed as Inconclusive, Indeterminate or
 1258 Insufficient) (see **3.1.209 inconclusive opinion**).
- 1259 NOTE In handwriting, this can be the presence of disguise in the questioned and/or known writing or a lack
 1260 of comparable writing.
- 1261 **3.1.261**
 1262 **non-original**
 1263 Reproduction of a document, e.g., photocopied, faxed, scanned, photographed.
 1264 (NIST HF)
- 1265 **3.1.262**
 1266 **non-ballpoint pen ink**
 1267 Writing or marking media intended for use in a writing or marking instrument other than a
 1268 ballpoint pen, including a dip or fountain pen, porous point pen, roller pen, marking instrument, etc.
 1269 Typically, a thin, low viscosity ink with a water or solvent base (it may also be expressed as fluid pen
 1270 ink).
- 1271 **3.1.263**
 1272 **nonimpact printer**
 1273 A printer in which image formation is not the result of mechanical impacts (e.g., thermal printer,
 1274 electrostatic printer, electrophotographic printer, ink jet printer).
- 1275 **3.1.264**
 1276 **observation**
 1277 Recognizing and noting an occurrence.
- 1278 **3.1.265**
 1279 **observational drawing**
 1280 A visuomotor task in which visual information (an object, a photograph, handwriting) has to be
 1281 translated into marks on the paper so that the copy ideally matches the original. Also known as
 1282 sketching.
- 1283 **3.1.266**
 1284 **off-foot**
 1285 The lack of desired and optimum uniformity of contact between the typeface
 1286 and the substrate. Also known as “off its feet”.
 1287 (SWGDOC E04)



- 1288 **3.1.267**
 1289 **offset**
 1290 Press design in which an image is transferred from a plate to a rubber blanket that moves the image
 1291 to the press sheet; offset principle allows plates to be right reading and generally gives a better-
 1292 quality image than do direct transfers.
- 1293 **3.1.268**
 1294 **offset lithography**
 1295 A rotary planographic process, which yields a flat printed image, producing both the image and non-
 1296 image areas of the plate chemically on one plane, creating the flat printing result. This process
 1297 utilizes viscous inks based on a mixture of oils and/or resins, containing pigments and additives.
- 1298 **3.1.269**
 1299 **offsite technical training**
 1300 Information, knowledge, or training gained by interaction with or demonstration by pertinent
 1301 manufacturers, businesses, and laboratories (e.g., paper mill, copier manufacturer) by going to a
 1302 particular location away from the usual training or work site.
- 1303 **3.1.270**
 1304 **opacity**
 1305 The property of paper that prevents the transmission of light.
 1306 (SWGDOC M03)
- 1307 **3.1.271**
 1308 **open top**
 1309 A letter formation such as the handwritten “a” or “o” in which the top has not been closed.
- 1310 **3.1.272**
 1311 **opinion**
 1312 Conclusion, judgment– a coherent, scientifically sound expression(s) that takes into consideration
 1313 task-relevant information in addition to observations, data, calculations and interpretations.
- 1314 **3.1.273**
 1315 **original typed text**
 1316 Typed text imprinted onto the surface of a record medium as the result of the impact of a typeface
 1317 striking directly or through a ribbon.
 1318 (SWGDOC E11)
- 1319 **3.1.274**
 1320 **originating document**
 1321 The document or other substrate with the handwriting, machine, or other markings that caused
 1322 indentation(s) on a document(s) or other substrate beneath it (the recipient document).
 1323 (ANSI/ASB Std 044)
- 1324 **3.1.275**
 1325 **overprint correction**
 1326 The removal of a typed character from the text by restriking with the same character while
 1327 interposing a tape or sheet coated with an opaque coating material, thereby causing the imprinted
 1328 character to be covered by the coating.
 1329 (SWGDOC E11)

- 1330 **3.1.276**
 1331 **overspray**
 1332 Type of extraneous or undesirable ink dot(s) near the printed zones which originate from the
 1333 printhead.
- 1334 **3.1.277**
 1335 **paper fiber impression**
 1336 The imprint of a paper fiber in the ribbon substrate.
 1337 (SWGDOC E11)
- 1338 **3.1.278**
 1339 **paraph**
 1340 A writing movement sweeping over or under a signature in a stylistic
 1341 manner, and is considered to be a part of the signature. 
- 1342 **3.1.279**
 1343 **parylene processing**
 1344 The deposition of a clear polymer coating on a document(s) within a vacuum chamber to
 1345 strengthen and stabilize the document(s).
 1346 (ANSI/ASB Std 127)
- 1347 **3.1.280**
 1348 **patching**
 1349 Returning to a portion of the writing for the retouching of a stroke, letter, or character.
- 1350 **3.1.281**
 1351 **payee perforator**
 1352 An optional device on a check writer that perforates or shreds a pattern above the numeric
 1353 impression region for the purpose of protecting the payee entry from alteration.
 1354 (SWGDOC E07)
- 1355 **3.1.282**
 1356 **pen emphasis**
 1357 The act of forcing the pen against the paper surface with increased pressure. When the pen point
 1358 has flexibility, this emphasis produces shading; but with more rigid writing points such as ball point
 1359 pens, heavy pen emphasis can occur without any evidence of shading.
- 1360 **3.1.283**
 1361 **pen direction**
 1362 The direction the pen moves to produce a character, connection, or signature.
 1363 (NIST HF)
- 1364 **3.1.284**
 1365 **pen lift**
 1366 An interruption in a stroke caused by removing the writing instrument from the writing surface.
- 1367 **3.1.285**
 1368 **pen nib**
 1369 The writing portion of a dip pen or fountain pen.

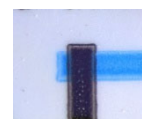
1370	3.1.286
1371	pen position
1372	The relationship of the writing instrument to the writing surface.
1373	3.1.287
1374	pen pressure
1375	The force with which the writing instrument contacts the paper.
1376	(SWGDOC T01)
1377	3.1.288
1378	perforation
1379	A small hole or a group of small holes punched in a sheet of paper.
1380	3.1.289
1381	phosphorescence
1382	Any delayed emission of optical radiation which appears 10 ns or longer after the excitation.
1383	(CIE S 017/E:2011 ILV)
1384	3.1.290
1385	photoluminescence
1386	Luminescence produced by the absorption of radiant flux; distinguished from ordinary reflection by
1387	a time delay and, usually, a shift toward longer wavelengths (see fluorescence and
1388	phosphorescence).
1389	(CIE S 017/E:2011 ILV)
1390	3.1.291
1391	piezoelectric
1392	Ink jet technology where the electrically stimulated deformation of a crystal causes the expulsion of
1393	the droplets from the ink chamber.
1394	(SWGDOC E06)
1395	3.1.292
1396	pitting
1397	Small defects in the surface of the photoreceptor that produce spots or voids on the printout.
1398	(ASTM F1457)
1399	3.1.293
1400	pixel
1401	Small single-colored square display elements that comprise a bitmap.
1402	3.1.294
1403	pixelation
1404	A grainy or blurry effect caused by displaying a bitmap or a section of a bitmap at such a large size
1405	that individual pixels are visible.
1406	3.1.295
1407	pixels per inch
1408	PPI
1409	The measure of resolution in a digital image or video display.

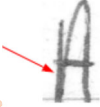
- 1410 **3.1.296**
 1411 **planchettes**
 1412 Small discs randomly distributed within the fibers or on the surface of security paper during the
 1413 paper manufacturing process.
- 1414 **3.1.297**
 1415 **planographic printing**
 1416 A method in which the image and non-image areas of the printing plate are on the same plane.
- 1417 **3.1.298**
 1418 **platen**
 1419 A flat or rounded surface with a variety of functions in printing or manufacturing. It can be a flat
 1420 metal (or earlier, wooden) plate pressed against a medium (such as paper) to cause an impression
 1421 in letterpress printing. May also refer to a typewriter roller, the glass surface of a copier, or an EDD
 1422 vacuum bed.
- 1423 **3.1.299**
 1424 **polyester film encapsulation**
 1425 A process whereby a document(s) or fragments of a document are sealed between two sheets of
 1426 polyester film to preserve, stabilize, and facilitate handling.
- 1427 **3.1.300**
 1428 **portrait mode**
 1429 A vertical orientation of a document or image.
- 1430 **3.1.301**
 1431 **prefix**
 1432 The portion of the check writer impression located immediately to the left of the numeric value.
 1433 (SWGDOC E07)
- 1434 **3.1.302**
 1435 **primary image**
 1436 The first instance in which an image is recorded onto any media that is a separate, identifiable
 1437 object (for example, a digital image recorded on flash media).
 1438 (SWGDOC D01)
- 1439 **3.1.303**
 1440 **primary indentation**
 1441 An impression on a document(s) or other substrate(s) beneath the originating document caused by
 1442 the act of writing or other dynamic actions.
 1443 (ANSI/ASB Std 044)
- 1444 **3.1.304**
 1445 **principal trainer**
 1446 Person with the primary responsibility for the training program administered to an individual.
- 1447 **3.1.305**
 1448 **printer**
 1449 Output device that produces a hardcopy record of data in the form of a sequence of discrete
 1450 graphics belonging to a predetermined character or image set.

- 1451 **3.1.306**
 1452 **printer output area**
 1453 Maximum area on the page to which the printer will print.
 1454 (ASTM F1457)
- 1455 **3.1.307**
 1456 **printhead**
 1457 Printing device of an ink jet or thermal printing system.
- 1458 **3.1.308**
 1459 **printing element**
 1460 The parts of the total checkwriter impression that are not parts of the prefix which may encompass
 1461 the currency type, decimal points, and commas.
 1462 (SWGDOC E07)
- 1463 **3.1.309**
 1464 **printing medium**
 1465 A substance used to create an image, such as printing ink, toner, or wax.
- 1466 **3.1.310**
 1467 **printing module**
 1468 Those components in the laser printer that together drive the laser scanner, create the image on the
 1469 page, and deliver the page to the stacker.
- 1470 **3.1.311**
 1471 **processed image**
 1472 Any image that has undergone enhancement, restoration, or other operation.
 1473 (SWGDOC D01)
- 1474 **3.1.312**
 1475 **proportions**
 1476 Relative size of characters, elements of characters, or of words.
- 1477 **3.1.313**
 1478 **proportional spacing**
 1479 A system of printing where the character spacing is set in accordance with the character width (see
 1480 [3.1.165 fixed pitch](#)).
 1481 (SWGDOC E04)
- 1482 **3.1.314**
 1483 **proposition (forensic)**
 1484 A statement or assertion about the origin or nature of the materials under examination, which is
 1485 either true or false.
- 1486 **3.1.315**
 1487 **purported writing**
 1488 Known writing not witnessed by the forensic document examiner.

- 1489 **3.1.316**
 1490 **qualified sources**
 1491 Organizations or individuals that provide, sponsor, or otherwise arrange for creditable training or
 1492 instruction on forensic document examination specific topics. These sources support, either
 1493 through reflection in their policies or by the individual presenting the training, the type of training
 1494 and required minimum criteria provided in American National Standards.
- 1495 **3.1.317**
 1496 **questioned**
 1497 Associated with the matter under investigation about which there is some dispute or query,
 1498 including, but not limited to, whether two or more items have a common source.
- 1499 **3.1.318**
 1500 **questioned writing**
 1501 **also Q**
 1502 Handwriting about which the authenticity or writership is in doubt.
 1503 (NIST HF)
- 1504 **3.1.319**
 1505 **rainbow printing**
 1506 A printing technique that combines different color inks to produce a subtle transition between
 1507 colors.
- 1508 **3.1.320**
 1509 **random error**
 1510 A component of error whereby replicate measurements vary in an unpredictable way. Sources of
 1511 random error are usually unexplained and therefore difficult to control.
 1512 (NIST HF)
- 1513 **3.1.321**
 1514 **randomly acquired characteristic**
 1515 **RAC**
 1516 A feature or defect that can occur in the manufacturing process or from individual usage occurring
 1517 after manufacture (for example, wear and damage defects such as cuts and gouges, reproducible
 1518 blemishes, impression voids, improper and extraneous inking, or coincidental peripheral printing).
 1519 The position, orientation, size and shape of these characteristics are features that are part of the
 1520 information a FDE uses to form an opinion about the probability of items being generated by the
 1521 same or different source.
- 1522 **3.1.322**
 1523 **range of variation**
 1524 The accumulation of deviations among repetitions of respective handwriting characteristics that are
 1525 typically demonstrated in the writing habits of an individual (see **3.1.421 variation**).
- 1526 **3.1.323**
 1527 **raster output scanner**
 1528 Output peripheral, either stand alone or within a printer, that converts computer data into a
 1529 bitmapped image, which is sent to the host for storage or a printer for output.

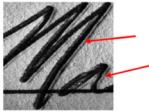
- 1530 **3.1.324**
 1531 **rebound**
 1532 A double impression of a typed character, the second lighter than and overlapping the first.
 1533 (SWGDOC E04)
- 1534 **3.1.325**
 1535 **recipient document**
 1536 The document or other substrate that received indentations, other paper fiber disturbances, or
 1537 other markings.
 1538 (ANSI/ASB Std 044)
- 1539 **3.1.326**
 1540 **record medium**
 1541 A piece of material, usually paper, on which an image or information is recorded.
- 1542 **3.1.327**
 1543 **reference collection**
 1544 An assemblage of established materials, substances, objects or artefacts of known properties or
 1545 origin that may be used in the determination of the properties or origins of unknown items.
- 1546 **3.1.328**
 1547 **relevant information**
 1548 Pertinent and applicable to the subject, material, or question being considered; the consideration
 1549 may be broad (i.e., discipline level) or specific (i.e., task level).
- 1550 **3.1.329**
 1551 **reliability**
 1552 Consistency of results as demonstrated by reproducibility or repeatability.
- 1553 **3.1.330**
 1554 **relief printing**
 1555 A method in which the image areas are above the non-image areas of the printing
 1556 plate.
- 1557 **3.1.331**
 1558 **repeatability**
 1559 A measure of reliability using the same FDE and the same instrument/method under exactly the
 1560 same conditions to arrive at the same conclusion or result.
 1561 (NIST HF)
- 1562 **3.1.332**
 1563 **reproducibility**
 1564 A measure of reliability using different FDEs and/or differing conditions with the same
 1565 measurement instrument/method to arrive at the same conclusion or result.
 1566 (NIST HF)
- 1567 **3.1.333**
 1568 **reproduction quality**
 1569 Extent to which a non-original document accurately replicates the features of the original
 1570 document.



- 1571 **3.1.334**
 1572 **requested writing**
 1573 Handwriting samples prepared by a particular person specifically for the purpose of comparison,
 1574 usually to questioned material.
- 1575 **3.1.335**
 1576 **result**
 1577 The product of the forensic service provider. This term is broad and may include observations, data,
 1578 calculations, interpretations, findings, and opinions.
- 1579 **3.1.336**
 1580 **retouching**
 1581 Adding handwritten lines or strokes in order to correct, improve, distort, or alter.
- 1582 **3.1.337**
 1583 **retrace**
 1584 A stroke written over the preceding stroke, typically in reverse direction. 
- 1585 **3.1.338**
 1586 **review, administrative**
 1587 An assessment of the non-technical content associated with an examination and report.
- 1588 NOTE This commonly includes, but may not be limited to, the verification of the presence of all documents
 1589 listed in the request for examination and the report, the verification of the appropriate marking of all
 1590 documents, the documentation of chain of custody, case notes, and typographical or other clerical errors.
- 1591 **3.1.339**
 1592 **review, technical**
 1593 An assessment by another qualified forensic document examiner to review the method(s) and
 1594 result(s) of the examiner of record to ensure the conclusion(s) rendered are supported.
- 1595 NOTE A technical review commonly includes, but may not be limited to, the adequacy of technical notes, the
 1596 verification of method(s) used, the determination of the adequacy or limitations of the evidence, the proper
 1597 use of equipment, whether all pertinent examinations were performed, whether the findings are consistent
 1598 with the observations noted/recorded during the examination, the applicable nature of any references, and
 1599 documentation of the performance of the review.
- 1600 **3.1.340**
 1601 **ribbon shift**
 1602 The movement of a multicolored inking ribbon allowing for a change in color to manifest itself in an
 1603 impressed character.
 1604 (SWGDOC E07)
- 1605 **3.1.341**
 1606 **roller device**
 1607 Wheel-type components designed to grab and transport paper into and through printers and
 1608 copiers.

- 1609 **3.1.342**
1610 **roller marks**
1611 Visible or latent indented features in paper resulting from transport rollers in a printing or copying
1612 system.
- 1613 **3.1.343**
1614 **rollerball pen**
1615 A writing instrument that uses a tiny, revolving ball to dispense liquid ink onto paper. Gel and
1616 ballpoint pens use the same ball mechanism to deposit their ink but use gel- and oil-based ink,
1617 respectively.
- 1618 **3.1.344**
1619 **rubber stamp**
1620 (See **3.1.376** stamping device.)
- 1621 **3.1.345**
1622 **sample**
1623 Subset of a group (i.e., the totality of items under consideration) made up of one or more items (i.e.,
1624 the individual parts into which that group is divided).
- 1625 NOTE A group may be real and finite, real and infinite, or completely hypothetical.
- 1626 **3.1.346**
1627 **satellites**
1628 Extraneous or undesirable toner particles or ink droplets (see spatter, spray).
- 1629 **3.1.347**
1630 **screen printing**
1631 A method in which the image areas are on fine mesh screen through which ink can penetrate and
1632 the non-image areas are a stencil over the screen.
- 1633 **3.1.348**
1634 **secondary indentation**
1635 **secondary impression**
1636 Fiber disturbance(s) not caused by the act of writing or other dynamic actions, rather caused by
1637 dynamic contact with the embossed side of an indentation(s) or other raised surface.
1638 (ANSI/ASB Std 044)
- 1639 **3.1.349**
1640 **set off**
1641 The unintentional transfer of part of an image or ink from its intended location to another surface.
1642 (ASTM F221)
- 1643 **3.1.350**
1644 **shading**
1645 Variations in the line width or density resulting from changes in the pressure of the writing
1646 instrument on the document; also associated with variations in pressure when using a split nib pen.
1647 Also referred to as stress.

- 1648 **3.1.351**
 1649 **side lighting**
 1650 Illumination from a light source at a low angle of incidence, or even parallel, to the surface of the
 1651 item. Syn. *oblique lighting*, *grazing illumination*, *raking lighting*.
 1652 (ANSI/ASB Std 044)
- 1653 **3.1.352**
 1654 **signature style**
 1655 1) Text-based (all allographs legible),
 1656 2) Mixed style (two or more allographs are legible),
 1657 3) Stylized (one or no allographs are legible).
 1658 (NIST HF)
- 1659 **3.1.353**
 1660 **significant difference**
 1661 A feature that is structurally divergent between items or groups of items, is outside the observed
 1662 range of variation of at least one of them, and that cannot be reasonably explained.
- 1663 **3.1.354**
 1664 **significant similarity**
 1665 A repeated distinguishing characteristic that is structurally similar between items or groups of
 1666 items and is within their observed range of variation (e.g., consistent height ratio, consistent pen
 1667 lift).
- 1668 **3.1.355**
 1669 **similarity**
 1670 A feature or characteristic observed in one item or group of items that is also observed in the same
 1671 form in a comparable item or group of items.
- 1672 **3.1.356**
 1673 **simplistic writing**
 1674 Characterized by non-complex characters or strokes.
 1675 (NIST HF)
- 1676 **3.1.357**
 1677 **simulation**
 1678 An attempt to copy or reproduce handwriting (e.g., tracing, free hand, non-spurious).
- 1679 **3.1.358**
 1680 **single element typewriter**
 1681 A typewriter that generates text via interchangeable “elements” that each contain a full set of
 1682 characters.
 1683 (SWGDOC E04)
- 1684 **3.1.359**
 1685 **single strike film ribbon**
 1686 An inked ribbon wherein the substrate is a plastic film material such as polyethylene, where each
 1687 area of the ribbon is capable of producing only one image.
 1688 (ASTM F221)

- 1689 **3.1.360**
 1690 **single strike paper ribbon**
 1691 An inked ribbon wherein the substrate is paper, where each area of the ribbon is capable of
 1692 producing only one image.
 1693 (ASTM F221)
- 1694 **3.1.361**
 1695 **sister lines**
 1696 Sporadic inkless or partially inkless indented lines in a writing surface that are
 1697 produced by the annular rim of a ball pen during the process of writing or making
 1698 other markings, and which precisely run parallel to the primary ink line laid down
 1699 by the ball pen. 
- 1700 **3.1.362**
 1701 **skill**
 1702 How well an individual is able to produce and repeat the formation of handwritten characters.
 1703 (NIST HF)
- 1704 **3.1.363**
 1705 **slant**
 1706 **slope**
 1707 The angle or inclination of the axis of letters relative to the baseline.
 1708 (NIST HF)
- 1709 **3.1.364**
 1710 **slit glass**
 1711 Alternate scanning surface found in some digital photocopiers used in conjunction with an
 1712 automatic document feeder.
 1713 (SWGDOC E06)
- 1714 **3.1.365**
 1715 **smudge**
 1716 A handwritten or machine printed character smeared or streaked, unintentionally, onto an adjacent
 1717 area.
- 1718 **3.1.366**
 1719 **source (of optical radiation)**
 1720 Object that produces light or other radiant flux.
 1721 (CIE S 017/E:2011 ILV)
- 1722 **3.1.367**
 1723 **spacing**
 1724 The distance between characters, words, or lines.
- 1725 **3.1.368**
 1726 **spatter**
 1727 Type of extraneous or undesirable ink droplet originating when a portion of an ink droplet strikes
 1728 the intended area and is deflected to an unintended area.
 1729 (ASTM F1857)

- 1730 **3.1.369**
 1731 **spectroscopy**
 1732 The study of the absorption or emission of electromagnetic energy by a chemical species as a
 1733 function of the energy incident upon that species; this analytical technique is used to identify
 1734 elements and/or atomic and molecular structure by measurement of the radiant energy absorbed
 1735 or emitted by a substance in any of the wavelengths of the electromagnetic spectrum.
- 1736 **3.1.370**
 1737 **specular reflection**
 1738 **regular reflection**
 1739 A mirror-like reflection of waves, such as light, that is reflected at a definite angle from a surface.
- 1740 **3.1.371**
 1741 **speed of execution**
 1742 The swiftness with which a body of writing or signature is prepared. With the exception of some
 1743 digitally captured writing, it cannot be measured precisely, but can be interpreted in broad terms
 1744 such as slow, moderate, or rapid.
- 1745 **3.1.372**
 1746 **spur**
 1747 A small, angled appendage at the beginning or end of a stroke revealing an abrupt
 1748 change of direction of the writing instrument. Also called hook or tick. 
- 1749 **3.1.373**
 1750 **squeegee effect**
 1751 The heavier concentration of ink on the edge of the ink line due to the ink being
 1752 squeezed outward by the pressure used in the relief printing process. 
- 1753 **3.1.374**
 1754 **staff**
 1755 The vertical strokes of letters, such as “B”, “T”, and “P”, that have a main stroke
 1756 connecting to the baseline. 
- 1757 **3.1.375**
 1758 **standard**
 1759 (See [3.1.74](#) collected writing, [3.1.327](#) reference collection.)
- 1760 **3.1.376**
 1761 **stamping device**
 1762 A hand-marking device capable of making an inked impression using a variety of die materials that
 1763 include, but are not limited to, vulcanized rubber, laserable rubber, photopolymer, gel, and metal.
 1764 Synonyms: hand stamp, self-inking stamp, pre-inked stamp, flat-die, cachet.
 1765 (ANSI/ASB Std 117)
- 1766 **3.1.377**
 1767 **stem – primary and secondary**
 1768 In typography, vertical or full-length angled strokes. Where there is a difference in the
 1769 stroke thicknesses in printed characters with more than one stroke connecting to the
 1770 baseline, the primary stem is thicker, and the secondary stem is thinner. 

- 1771 **3.1.378**
 1772 **stochastic screening**
 1773 An alternative to traditional halftone dots, this random-placement dot strategy uses frequency
 1774 modulation (FM) to render enlarged images on large format printing devices. Unlike halftone, the
 1775 dots are of a uniform size with darker areas having more dots packed closer together.
- 1776 **3.1.379**
 1777 **stroke**
 1778 A single written line, either ascending, descending, or lateral in the formation of a letter or any of its
 1779 parts.
 1780 (H&H Glossary)
- 1781 **3.1.380**
 1782 **structural features**
 1783 Characteristics relating to the construction of handwriting (e.g., number, position, order, and
 1784 direction of strokes) (see **3.1.136 ductus**).
- 1785 **3.1.381**
 1786 **style (design)**
 1787 The general category of allograph (letter form) that is employed to execute writing, e.g., cursive or
 1788 hand printing.
 1789 (NIST HF)
- 1790 **3.1.382**
 1791 **submersion**
 1792 The process of placing a document(s) into a liquid that is appropriate to facilitate cleaning,
 1793 unfolding, or separating the document(s).
- 1794 **3.1.383**
 1795 **substrate**
 1796 A material or surface that is written on, usually paper.
- 1797 **3.1.384**
 1798 **sufficient quantity (general)**
 1799 The amount of material required to assess the distinguishing features of the questioned item(s) or
 1800 known item(s) based on the expert's professional judgement.
- 1801 **3.1.385**
 1802 **sufficient quantity (handwriting)**
 1803 The amount of writing required to assess the writer's distinguishing features and range of variation
 1804 based on the expert's professional judgement.
- 1805 **3.1.386**
 1806 **suitability**
 1807 Sufficient quantity, quality, and complexity for comparison purposes.

- 1808 **3.1.387**
 1809 **systematic error**
 1810 A component of error whereby replicate measurements remain constant or vary in a predictable
 1811 way - for example an uncalibrated instrument would produce a constant systematic error.
 1812 (NIST HF)
- 1813 **3.1.388**
 1814 **task-irrelevant information**
 1815 Information that is not pertinent or applicable to the subject, material, or question being
 1816 considered. The consideration may be broad (i.e., case or discipline level) or specific (i.e., task level)
 1817 (see [3.1.32 bias](#), [3.1.33 bias cognitive](#), [3.1.34 bias confirmation](#), [3.1.34 bias contextual](#)).
- 1818 **3.1.389**
 1819 **task-relevant information**
 1820 Information that is pertinent and applicable to the subject, material, or question being considered.
 1821 The consideration may be broad (i.e., case or discipline level) or specific (i.e., task level) (see [3.1.32](#)
 1822 [bias](#), [3.1.33 bias cognitive](#), [3.1.34 bias confirmation](#), [3.1.34 bias contextual](#)).
- 1823 **3.1.390**
 1824 **technical visit**
 1825 Travel for the purpose of obtaining information, knowledge, or training, including interaction with
 1826 or demonstration by pertinent manufacturers, businesses, and laboratories.
 1827 (SWGDOC G02)
- 1828 **3.1.391**
 1829 **terminal stroke**
 1830 The final stroke of a character or word.
- 1831 **3.1.392**
 1832 **thermal imaging transfer ribbon**
 1833 Plastic film or other material, upon which a dye or pigmented coating is applied; imaging results
 1834 when a thermal printhead transfers the coating onto a suitable substrate or receptor media.
 1835 (ASTM F1623)
- 1836 **3.1.393**
 1837 **thermal impulse**
 1838 Ink jet technology where the rapid expansion of a bubble in the ink created by localized electrical
 1839 heating expels the droplets from the ink chamber.
 1840 (SWGDOC E06)
- 1841 **3.1.394**
 1842 **thermal paper printing**
 1843 A non-impact method in which the image is formed by the action of heat on a treated substrate.
- 1844 **3.1.395**
 1845 **thermal print head**
 1846 Mechanism for printing with a temperature-sensitive substance; heat transfer is affected by
 1847 touching heated pin tips to the material to cause a reaction.

- 1848 **3.1.396**
 1849 **thermal ribbon**
 1850 Plastic film or other material, upon which a dye or pigmented coating is applied; imaging results
 1851 when a thermal printhead transfers the coating onto a suitable substrate or receptor media.
- 1852 **3.1.397**
 1853 **thermal transfer printing**
 1854 A non-impact method in which the image is created by the action of a heated print head through a
 1855 medium coated ribbon. This includes wax transfer, dye sublimation, and thermal fusion methods.
- 1856 **3.1.398**
 1857 **thermography**
 1858 A two-stage printing method in which a resinous powder adheres to wet ink. After heating, the
 1859 compound rises to resemble raised or engraved printing.
- 1860 **3.1.399**
 1861 **thimble element**
 1862 An element used in an impact printing device in which the fully formed characters are located on
 1863 the ends of finger-like devices that are similar to a daisy wheel except that the device is formed to
 1864 produce a cup-like or thimble structure.
 1865 (SWGDOC E04-13)
- 1866 **3.1.400**
 1867 **thread count (in typewriter/printer ribbons)**
 1868 The total number of horizontal and vertical threads per in.² of fabric.
- 1869 **3.1.401**
 1870 **tooth**
 1871 Quality of paper, or other writing surface that causes drag or resistance to the pen. A smooth, slick
 1872 surface with no tooth can result in thick hairlines and lack of control in writing. Medium tooth
 1873 causes just enough drag on the pen to facilitate control, produce fine hairlines and allow the writing
 1874 process to be rhythmical. Too much tooth impedes ink flow and progress of the pen.
- 1875 **3.1.402**
 1876 **tracing**
 1877 Handwriting prepared by drawing the image of a genuine writing on a target document, which may
 1878 be produced with the aid of carbon paper, transmitted light, or indented lines.
- 1879 **3.1.403**
 1880 **training**
 1881 The formal, structured process through which a person progresses from their current level of
 1882 knowledge and expertise to the level of competency required to conduct specific tasks in
 1883 accordance with American National Standards.
- 1884 **3.1.404**
 1885 **tram lines**
 1886 An accumulation of ink found on both sides of an ink line, typically caused by
 1887 squeegee effect from a gel ink pen.



- 1888 **3.1.405**
 1889 **transmitted lighting**
 1890 Illumination that passes through a document.
 1891 (ANSI/ASB Std 035)
- 1892 **3.1.406**
 1893 **tremor**
 1894 Shaky, irregular handwriting movements that are slowly executed or written by a person suffering
 1895 from advanced age, nervousness, drug/alcohol influence, or physical/mental infirmities. These
 1896 features can also be characteristic of unnaturally slow pen movements due to conscious attention to
 1897 letterforms in deliberate drawings, rather than spontaneous writings.
- 1898 **3.1.407**
 1899 **trough**
 1900 The lighter or non-inked furrow between the tram lines typically seen in
 1901 gel pen writing.
- 1902 **3.1.408**
 1903 **type of writing**
 1904 Refers to hand printing, cursive writing, numerals, symbols, or combinations thereof, and
 1905 signatures.
 1906 (SWGDOC E01)
- 1907 **3.1.409**
 1908 **type slug**
 1909 The block (usually metal) attached to the end of the typebar that bears the typeface.
 1910 (SWGDOC E04)
- 1911 **3.1.410**
 1912 **typebar**
 1913 A bar, mounted on a typewriter, that holds a type slug(s).
 1914 (SWGDOC E04)
- 1915 **3.1.411**
 1916 **typeface**
 1917 The portion of the element or type slug that projects from the body and contacts the surface of the
 1918 substrate to form the character.
 1919 (SWGDOC E04)
- 1920 **3.1.412**
 1921 **typeface defect**
 1922 Deviation from the intended appearance of a character due to physical damage to the typeface or its
 1923 malformation in manufacture.
 1924 (SWGDOC E04)
- 1925 **3.1.413**
 1926 **typestyle**
 1927 A particular variant of a type design.
 1928 (SWGDOC E04)



- 1929 **3.1.414**
 1930 **typestyle classification scheme**
 1931 Hierarchical taxonomic schematic, key, or computer database that can be used to determine the
 1932 source of a particular typestyle.
 1933 (SWGDOC E04)
- 1934 NOTE These schemes are only an aid for searching a typestyle library and are not a substitute for actual
 1935 reference materials in the typestyle library.
- 1936 **3.1.415**
 1937 **typestyle library**
 1938 An organized collection of reference samples of typestyles and related materials.
 1939 (SWGDOC E04)
- 1940 NOTE Reference materials can also include information such as typestyle catalogs, treatises relative to
 1941 typography and the design of typestyles used on typewriters and other printing systems, typewriters, type
 1942 slugs, type elements, actual strike-ups, and instruction and repair manuals.
- 1943 **3.1.416**
 1944 **typewriter**
 1945 A self-contained machine for character-by-character direct writing by means of keyboard operated
 1946 typefaces.
 1947 (SWGDOC E04)
- 1948 **3.1.417**
 1949 **typewriter grid**
 1950 **schneeberger grid**
 1951 A network of uniformly spaced horizontal and perpendicular lines, generally on a glass or acetate
 1952 surface, used to check the alignment characteristics of typewriting or printing. The grids come in
 1953 varying sizes and are physically placed on top of the document for measuring. Computer
 1954 technology allows for these to be created in any spacing desired and overlaid on an image that has
 1955 been imported into the computer.
- 1956 **3.1.418**
 1957 **ultraviolet**
 1958 **UV**
 1959 **ultraviolet radiation**
 1960 **UVR**
 1961 Radiation for which the wavelengths are shorter than those for visible radiation.
- 1962 NOTE 1 The range between 100 nm and 400 nm is commonly subdivided into:
 1963 UV-A: 315 nm to 400 nm;
 1964 UV-B: 280 nm to 315 nm;
 1965 UV-C: 100 nm to 280 nm.
- 1966 NOTE 2 A precise border between “ultraviolet” and “visible” cannot be defined, because visual sensation at
 1967 wavelengths shorter than 400 nm is noted for very bright sources.
 1968 (CIE S 017/E:2011 ILV)

1969	3.1.419
1970	unaccustomed hand
1971	The opposite hand (or other body part) from that normally used for writing.
1972	(SWGDOC T01)
1973	3.1.420
1974	unnatural writing
1975	A writing movement not typical in day-to-day writing that may be the result of intent, or internal/
1976	external factors.
1977	
1978	NOTE Some characteristics of unnatural writing movements include slow speed, poor line quality, poor line
1979	continuity with stops or hesitations in the pen line, and blunt commencement and termination strokes. This is
1980	often seen in disguised or simulated writing.
1981	3.1.421
1982	variation (handwriting)
1983	One or more forms (constructions) of a character or word in a naturally produced sample of
1984	handwriting. These deviations among repetitions of the same handwriting characteristic(s) are
1985	normally demonstrated in the habits of each writer.
1986	3.1.422
1987	variation (typewriters and printers)
1988	Imprecise duplication in multiple impressions from the same machine. The cause of this may be
1989	manifested due to wear and tear in a machine part(s).
1990	3.1.423
1991	verification
1992	The subsequent independent examination by another trained and competent examiner to either
1993	support or refute the conclusions of the original examiner. Verification for some laboratories may
1994	require that original items need to be examined.
1995	3.1.424
1996	visible radiation
1997	Any optical radiation capable of causing a visual sensation directly.
1998	NOTE There are no precise limits for the spectral range of visible radiation since they depend upon the
1999	amount of radiant power reaching the retina and the responsivity of the observer. The lower limit is generally
2000	taken between 360 nm and 400 nm and the upper limit between 760 nm and 830 nm.
2001	(CIE S 017/E:2011 ILV)
2002	3.1.425
2003	watermark
2004	A translucent design, pattern, or symbol created in paper by varying the opacity or distribution of
2005	fibers within an area of the paper to identify the manufacturer, brand, or customer. It is best seen
2006	when held up to light.
2007	3.1.426
2008	writer
2009	The individual who applies handwritten markings with a writing instrument on a substrate.

2010	3.1.427
2011	writing instrument
2012	Any tool used to create handwritten markings on a substrate. Typically used to describe the use of a
2013	pen, pencil, crayon, or other marker.
2014	3.1.428
2015	writing movement
2016	A pattern of the action of a writing instrument. These movements may be described as garland,
2017	arcade, angular, or indeterminable.
2018	3.1.429
2019	writing surface
2020	The underlying plane on which the substrate, or the writing itself, is placed.
2021	

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Annex A (informative)

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