Digital Radiographic Definitions

Achievable Contrast Sensitivity (CSa)—optimum contrast sensitivity obtainable using a standard phantom with an X-ray technique that has little contribution from scatter.

active DDA area—the size and location of the DDA, which is recommended by the manufacturer as usable.

aliasing—artifacts that appear in an image when the spatial frequency of the input is higher than the output is capable of reproducing. This will often appear as jagged or
stepped sections in a line or as moiré patterns.

amorphous selenium (a-Se) radiation detector array—an array employing a biased amorphous selenium photo-conductor that directly converts incident radiation into electrical charge which can then be read to form a digital image.

amorphous silicon (α-Si) X-ray detector, *n*—an amorphous silicon (α-Si) X-ray detector consists of a glass substrate with a matrix of photodiodes fabricated from amorphous silicon and switches arranged in rows and columns upon it; the photodiodes are activated by light photons emitted from a scintillator which is activated by X rays and is usually in close contact with the diode matrix.

analog image—an image produced by a continuously variable physical process (for example, exposure of film).

analog to digital converter (a/d)—a device that changes an analog signal to a digital representation of the signal.

array processor—a special purpose logical processing device that performs extremely fast mathematical operation on digital arrays.

back scattered radiation—radiation which is scattered more than 90° with respect to the incident beam, that is, backward in the general direction of the radiation source.

basic spatial resolution (SRb)—basic spatial resolution indicates the smallest geometrical detail, which can be resolved using the DDA. It is similar to the effective pixel size.

bad pixel—a pixel identified with a performance outside of the specification range for a pixel of a DDA as defined in Practice E2597.

banding—linear striping aligned parallel to the IP transport direction, which may be caused by improper scanner normalization.

binary/digital pixel data—a matrix of binary (0's, 1's) values resultant from conversion of PSL from each latent pixel (on the IP) to proportional (within the bit depth scanned) electrical values. Binary digital data value is proportional to the radiation dose received by each pixel.

bit depth—the number "2" increased by the exponential power of the analogue-to-digital (A/D) converter resolution. Example *1*) In a 2-bit image, there are four (22) possible combinations for a pixel: 00, 01, 10 and 11. If "00" represents black and "11" represents white, then "01" equals dark gray and "10" equals light gray. The bit depth is two, but the number of gray scales shades that can be represented is 22 or 4. Example *2*): A 12-bit A/D converter would have 4096 (212) gray scales shades that can be represented.

blooming or flare—an undesirable condition exhibited by some image conversion devices brought about by exceeding the allowable input brightness for the device, causing the image to go into saturation, producing an image of degraded spatial resolution and gray scale rendition.

blow back—the enlargement of a minified radiograph to its original size by use of an optical direct reader.

burn-in—change in gain of the scintillator that persists well beyond the exposure

calibration—correction applied for the offset signal and the non-uniformity of response of any or all of the X-ray beam, scintillator, and the read out structure.

cassette—a light-tight container for holding radiographic recording media during exposure, for example, film, with or without intensifying or conversion screens.

cine-radiography—the production of a series of radiographs that can be viewed rapidly in sequence, thus creating an illusion of continuity.

component—the part(s) or element of a system assembled or processed to the extent specified by the drawing, purchase order, or contract.

computed radiology (photo stimulated luminescence method)—a two-step radiological imaging process; first, a storage phosphor imaging plate is exposed to penetrating radiation; second, the luminescence from the plate's photostimulable luminescent phosphor is detected, digitized, and presented via hard copy or a CRT.

computed radiographic system—all hardware and software components necessary to produce a computed radiograph. Essential components of a CR system consisting of: an imaging plate, an imaging plate readout scanner, electronic image display, image storage and retrieval system and interactive support software.

computed radiographic system class—a group of computed radiographic systems characterized with a standard image quality rating. Practice E2446, Table 1, provides such a classification system.

computed radiography—a radiological nondestructive testing method that uses storage phosphor imaging plates (IP's), a PSL stimulating light source, PSL capturing optics, optical-to-electrical conversion devices, analogue-to-digital data conversion electronics, a computer and software capable of processing original digital image data and a means for electronically displaying or printing resultant image data.

constant potential—a method of electrically generating X-rays by placing a constant potential electrical source (voltage and current) across the X-ray tube anode and cathode; the ripple component of the constant potential electrical source is typically less than 2.0 %.

contrast-to-noise ratio (CNR)—quotient of the difference of the mean linear pixel values between two image areas (Digital image contrast) and the standard deviation of the linear pixel values. Another way of saying this is that CNR is the difference between pixel values of adjacent areas.

contrast sensitivity—a measure of the minimum percentage change in an object which produces a perceptible density/brightness change in the radiological image.

contrast stretch—a function that operates on the greyscale values in an image to increase or decrease image contrast.

CR phantom—a device containing an arrangement of test targets used to evaluate the image quality of a CR system, as well as monitoring the image quality of the chosen system

definition, image definition—the sharpness of delineation of image details in a radiograph. Generally used qualitatively.

detector signal-to-noise ratio–normalized (dSNRn)—the SNR is normalized for basic spatial resolution SRb as measured directly on the detector without any object other than beam filters in the beam path.

DDA gain image—image obtained with no structured object in the x-ray beam to calibrate pixel response in a DDA

DDA offset image—image of the DDA in the absence of x-rays providing the background signal of all pixels

digital—the representation of data or physical quantities in the form of discrete codes, such as numerical characters, rather than a continuous stream.

digital detector array (DDA)—an electronic device that converts ionizing or penetrating radiation into a discrete array of analog signals which are subsequently digitized and transferred to a computer for display as a digital image corresponding to the radiologic energy pattern imparted upon the input region of the device.

digital driving level (DDL)—terminology used to describe displayed pixel brightness of a digital image on a monitor resultant from digital mapping of various gray scale levels within specific look-up-table(s). **Discussion**— DDL is also known as monitor pixel intensity value; thus, may not be the PV of the original digital image.

digital dynamic range—maximum material thickness latitude that renders acceptable levels of specified image quality performance within a specified pixel intensity value range. **Discussion**—Digital dynamic range should not be confused with computer file bit depth.

digital image—an image composed of discrete pixels each of which is characterized by a digitally represented luminance level.

digital image acquisition system—a system of electronic components which, by either directly detecting radiation or converting analog radiation detection information, creates an image of the spatial radiation intensity map comprised of an array of discrete digital intensity values.

digital image contrast—pixel value difference between any two areas of interest within a computed radiograph. **Discussion**—digital contrast = **PV2 – PV1** where PV2 is the pixel value of area of interest "2" and PV1 is the pixel value of area of interest "1" on a computed radiograph. Visually displayed image contrast can be altered via digital re-mapping or reassignment of specific gray scale shades to image pixels.

digital image enhancement—any operation used for the purpose of enhancing some aspect of the original image.

digital image noise—imaging information within a computed radiograph that is not directly correlated with the degree of radiation attenuation by the object or feature being examined and/or insufficient radiation quanta absorbed within the detector IP. **Discussion**—Digital image noise results from random spatial distribution of photons absorbed

within the IP and interferes with the visibility of small or faint detail due to statistical variations of pixel intensity value.

digital image processing system—a system which uses algorithms to process digital image data. **Discussion**—Examples include: contrast, brightness, pixel density change (digital enlargement), digital filters, gamma correction and pseudo colors. Some digital processing operations such as sharpening filters, once saved, permanently change the original binary data matrix.

digital magnification (zoom)—any change in the pixel mapping ratio between the captured image and the displayed image, effectively making objects in the image appear larger or smaller.

digitize (for radiology)—the act of converting an analog image or signal to a digital presentation.

duplex plate phantom—two plates of the same material; Plate 2 has same size in x- and half the size in v- direction of Plate 1; the thickness of Plate 1 matches the minimum thickness of the material for inspection; the thickness of Plate 1 plus Plate 2 matches the maximum thickness of the material for inspection

dynamic range (for radiology)—the span of signal intensity which defines the system's range of performance.

efficiency—dSNRn divided by the square root of the dose (in mGy) and is used to measure the response of the detector at different beam energies and qualities.

energy—a property of radiation that determines the penetrating ability. In X-ray radiography, energy machine rating is determined by kilo electron volts (keV), million electron volts (MeV). In gamma ray radiography, energy is a characteristic of the source used.

equivalent I.Q.I. sensitivity—that thickness of I.Q.I. expressed as a percentage of the section thickness radiologically examined in which a 2T hole or 2 % wire size equivalent would be visible under the same radiological conditions.

equivalent penetrameter sensitivity (EPS)—that thickness of penetrameter, expressed as a percentage of the section thickness radiographed, in which a 2T hole would be visible under the same radiographic conditions. EPS is calculated by: EPS% = 100/ X (√ Th/2), where: h = hole diameter, T = step thickness and X= thickness of test object.

erasable optical medium—an erasable and rewritable storage medium where the digital data is represented by the degree of reflectivity of the medium recording layer; the data can be altered.

exposure, radiographic exposure—the subjection of a recording medium to radiation for the purpose of producing a latent image. Radiographic exposure is commonly expressed in terms of milliampere-seconds or millicurie-hours for a known source-to-film distance.

exposure linearity – a constant increment of exposure (dose) produces a constant change in pixel value.

fading—the reduction of intensity of the stored image in the imaging plate over time.

filter—uniform layer of material, usually of higher atomic number than the specimen, placed between the radiation source and the film for the purpose of preferentially absorbing the softer radiations.

five-groove wedge—a continuous wedge with five long grooves on one side.

fluorescence—the emission of light by a substance as a result of the absorption of some other radiation of shorter wavelengths only as long as the stimulus producing it is maintained.

fluoroscopy—the visual observation on a fluorescent screen of the image of an object exposed to penetrating, ionizing radiation.

focal spot—for x-ray generators, that area of the anode (target) of an x-ray tube which emits x-ray when bombarded with electrons.

forward scattered radiation—radiation which is scattered less than 90° with respect to the incident beam, that is, forward in the general direction of the radiation source.

frame rate—number of frames acquired per second (fps).

gain—overall signal amplification of the scanning system.

gamma-radiography—a technique of producing radiographs using gamma-rays.

gamma ray—electromagnetic penetrating radiation having its origin in the decay of a radioactive nucleus.

geometric unsharpness[3]—the penumbral shadow in a radiological image which is dependent upon 1) the radiation source dimensions, 2) the source to object distance, and 3) object to detector distance.

ghosting—residual signal or image from a prior exposure in a current image. Signal or image can be negative or positive and may affect interpretation of the image.

GlobalLag1f (global lag 1st frame)—the ratio of mean signal value of the first frame of the DDA where the X-rays are completely off to the mean signal value of an image where the X-rays are fully on. This parameter is specifically for the integration time used during data acquisition.

GlobalLag1s (global lag 1 s)—the projected value of GlobalLag1f for an integration time of 1 se. *GlobalLag60s (global lag 60 s)*—the ratio between mean gray value of an image acquired with the DDA after 60 s where the X-rays are completely off, to same of an image where the X-rays are fully on.

gray value—the numeric value of a pixel in the DDA image. This is typically interchangeable with the term pixel value, detector response, Analog-to-Digital unit and detector.

grayscale—The range of pixels values based on the number of bits for the A/D card.

grooved wedge—a wedge with one groove, that is 5 % of the base material thickness and that is used for achievable contrast sensitivity measurement in Practice E2597.

half-life—the time required for one half of a given number of radioactive atoms to undergo decay.

half-value layer (HVL)—the thickness of an absorbing material required to reduce the intensity of a beam of incident radiation to one half of its original intensity.

half-value thickness—the thickness of a specified substance which, when introduced into the path of a given beam of radiation, reduces its intensity to one half.

image data file—a digital file containing radiological image and text information.

image morphing—a potentially degraded CR image resultant from over processing (that is, over driving) an original CR image. **Discussion**—"Morphing" can occur following several increments of image processing where each preceding image was "overwritten" resulting in an image that is noticeably altered from the original.

image processing—a method whereby digital image data is transformed through a mathematical function.

image quality indicator (IQI)—in industrial radiology, a device or combination of devices whose demonstrated image or images provide visual or quantitative data, or both, to determine radiologic quality and sensitivity. Also known as a penetrameter.

iSR_b image—The interpolated basic spatial resolution of the imaging system, which corresponds to the dimension of the smallest feature that can be resolved at a modulation of twenty percent with geometric magnification.

iSR$_b$ detector—The interpolated basic spatial resolution of a detector, which corresponds to the dimension of the smallest feature that can be resolved at a modulation of twenty percent without geometric magnification.

indication, *n*—the response or evidence from a nondestructive examination that requires interpretation to determine relevance.

internal scatter radiation (ISR)—scattered radiation within the detector.

IQI sensitivity—in radiography, the minimum discernible image and the designated hole in the plaque-type, or the designated wire image in the wire type image quality indicator.

iSRbdetector—the interpolated basic spatial resolution of the detector indicates the smallest geometric detail, which can be resolved spatially using a digital detector array with no geometric magnification. NOTE 1—It is equal to 1⁄2 of the measured detector unsharpness and it is determined from a digital image of the duplex wire IQI (Practice E2002), directly placed on the DDA without object. The *iSRb* detector value is determined from the interpolated or approximated modulation depth of two, or several, neighbor wire pairs at 20 % modulation depth.

keV (kilo electron volt)—a unit of energy equal to 1000 electron volts, that is, the energy gained by an electron or proton moving through a potential difference of 1000 volts in a vacuum.

kV (kilo volts)—a unit of energy gained or lost by the charge of a single electron moving across an electric potential difference of one thousand volts.
DISCUSSION—Often used to express the accelerating potential of an electrostatic X-ray source, such as an X-ray tube

kVp (kilo volts peak)—a unit used to express the peak voltage of a time varying electrical potential of an X-ray source, such as a rectified X-ray generator system.

lag—residual signal in the DDA that occurs shortly after detector read-out and erasure.

laser beam jitter—a lack of smooth movement of the laser scanning device, which results in jagged scan lines on the image.

like section—a separate section of material that is similar in shape and cross section to the component or part being radiologically inspected, and is made of the same or
radiologically similar material.

line pairs per millimetre—a measure of the spatial resolution of an image conversion device. A line pair test pattern consisting of one or more pairs of equal width, high contrast lines and spaces is utilized to determine the maximum density of lines and spaces that can be successfully imaged. The value is expressed in line pairs per millimetre.

line pair test pattern—a pattern of one or more pairs of objects with high contrast lines of equal width and equal spacing. The pattern is used with an imaging device to measure spatial resolution.

linear accelerator—an electron generator in which the acceleration of the particles is connected with the propagation of a high-frequency field inside a linear or corrugated waveguide.

linear digital image contrast—mean linear pixel value difference between any two regions of interest within a digital image. Linear digital image contrast = PV2 – PV1, where PV2 is the mean linear pixel value of region of interest “2” and PV1 is the mean linear pixel value of region of interest “1” on a digital image.

linear pixel value—the numeric value of a pixel in a digital image, which is directly proportional to the radiation dose of the corresponding detector element where a zero value represents the unexposed detector.

linearized signal intensity—a numerical signal value of a picture element (pixel) of the digital image, which is proportional to the radiation dose. The linearized signal intensity is zero, if the radiation dose is zero.

location marker—a number or letter made of lead (Pb) or other highly radiation attenuative material that is placed on an object to provide traceability between a specific area on the image and the part.

look up table (LUT)—one or more fields of binary digital values arbitrarily assigned to a range of reference gray scale levels (viewed on an electronic display as shades of"gray"). **Discussion**—A LUT is used (applied) to convert binary digital pixel data to proportional shades of "gray" that define the CR image. LUT's are key reference files that allow binary digital pixel data to be viewed with many combinations of pixel gray scales over the entire range of a digital image.

long-term stability—performance measurements of a CR system over the life-cycle of the devices, used to evaluate relative system performance over time.

low-energy gamma radiation—gamma radiation having energy less than 200 keV.

luminosity—a measure of emitted light intensity.

mA (milliampere)—a unit of current equal to 0.001 amperes, used to express the tube current of an X-ray tube.

magnetic storage medium—a storage medium that uses magnetic properties (magnetic dipoles) to store digital data (for example, a moving drum, disk, or tape or a static core or film).

mandatory examination requirements—those CR examinations that are a part of the required radiologic examinations specified in the contract documents.

manufacturer—CR system manufacturer, supplier for the user of the CR system.

material group—materials that have the same predominant alloying elements and which can be examined using the same IQI. A listing of common material groups is given in Practice E1025.

MeV (mega electron volt)—a unit of energy equal to 1 000 000 electron volts, that is, the energy gained by an electron or proton moving through a potential difference of 1 000 000 volts in a vacuum.

DISCUSSION—A unit of the maximum photon energy of a bremsstrahlung X-ray spectrum, when used to describe an X-ray source.

material thickness range (MTR)—the wall thickness range within one image of a DDA, whereby the thinner wall thickness does not saturate the DDA and at the thicker wall thickness, the signal is significantly higher than the noise.

micro focus X-ray tube—an X-ray tube having an effective focal spot size not greater than 100 μm.

milliamperes (mA)—the technical term is **tube current** and is defined as the current passing between the cathode and anode during the operation of an x-ray tube, measured in milliamperes (mA) and usually taken as a measure of x-ray intensity.

minifocus X-ray tube—an X-ray tube having an effective focal spot size between 100 and 400 μm.

MV (mega volt)—unit of electrical potential difference equal to 1 000 000 volts.
DISCUSSION—Often used to express the accelerating potential of an electrostatic X-ray source; when used to describe an accelerator-based X-ray source, the accelerating potential that would produce the same electron energy and X-ray spectrum if an electrostatic source were available.

modulation transfer function (MTF)—The normalized magnitude of the Fourier-transform (FT) of the differentiated edge spread function (ESF) of the linearized PSL (photo stimulated luminescence) intensity, measured perpendicular to a sharp edge. MTF describes the contrast transmission as a function of the object size. In this practice, the MTF characterizes the unsharpness of the CR system. This depends on the scanning system itself and IP-type and cassette employed.

noise—the data present in a radiological measurement which is not directly correlated with the degree of radiation attenuation by the object being examined. There are two types of noise, electronic noise and the noise associated with X-Ray scatter.

non-erasable optical data—a non-erasable, non-rewriteable storage medium where the digital data is represented by the degree of reflectivity of the mediums recording layer. The data cannot be altered.

normalized signal-to-noise ratio (SNR_N)—is the SNR, normalized to a prescribed detection area.
DISCUSSION—SNR_N can be calculated using a diameter of 100 microns by the basic spatial resolution SR_b, as measured directly in the digital image and calculated by $SNR_N = SNR \times (88.6\ \mu m/SR_b)$.

nuclear activity—the number of disintegrations occurring in a given quantity of material per unit of time. “Curie” is the unit of measurement. One curie is equivalent to 3.7×10^{10} disintegrations per second.

optional examination—those examinations that are conducted for process verification or information only and are not a part of the required radiologic examinations specified in the contract documents.

original digital image—a digital gray scale image resultant from application of original binary digital pixel data to a linear look-up table prior to any image processing. **Discussion**—This original gray scale image is usually considered the beginning of the "computed radiograph", since without this basic conversion (to gray scales) there would be no discernable radiographic image.

pair production—the process whereby a gamma photon with energy greater than 1.02 MeV is converted directly into matter in the form of an electron-positron pair. Subsequent annihilation of the positron results in the production of two 0.511 MeV gamma photons.

pencil beam—a radiation beam which has little divergence, usually created by collimating an intense source of radiation.

penetrameter—alternative term for **image quality indicator**.

penetrameter sensitivity—alternative term for **IQI sensitivity**.

phantom—a part or item being used to quantify DDA characterization metrics

phosphor—any substance that can be stimulated to emit light by incident radiation.

photostimulable luminescence—the physical phenomenon of phosphors absorbing incident ionizing radiation, storing the energy in quasi-stable states and emitting luminescent radiation proportional to the absorbed energy when stimulated by radiation of a different wavelength.

photostimulable luminescent phosphor—a phosphor capable of storing a latent radiological image which upon laser stimulation will generate luminescence proportional to the radiation intensity.

pixel—The smallest addressable element in an electronic image.

pixel binning – pixel averaging into larger super pixels, i. e., a grouping of smaller pixels into a larger single pixel.

pixel brightness—the luminous (monitor) display intensity of pixel(s) that can be controlled by means of electronic monitor brightness level settings or changes of digital driving level.

pixel density—the number of pixels within a digital image of fixed dimensions (that is, length and width). **Discussion**—for digital raster images, the convention is to describe pixel density in terms of the number of pixel-columns (width) and number of pixel rows (height). An alternate convention is to describe the total number of pixels in the image area (typically given as the number of mega pixels), which can be calculated by multiplying pixel-columns by pixel-rows. Another convention includes describing pixel density per area-unit or per length-unit such as pixels per in./mm. Resolution of a digital image is related to pixel density.

pixel, display size—the dimensions of the smallest picture element comprising the displayed image, given in terms of the imaged object's dimensions being represented by the element.

pixel size—the length and width of a pixel.

pixel value (PV)—the numeric value of a pixel in a digital image.

PMT—photomultiplier tube or other light capture device used by the specific scanner.

PMT non-linearity—deviation from a linear response of the PMT at high light input values or from step changes in light. **Discussion**—At high light input values the PMT may under-respond, also the PMT may over-shoot or undershoot
in response to a step change in light.

primary radiation—radiation coming directly from the source.

PSL afterglow—continued luminescence from a storage phosphor immediately following removal of an external photostimulating source. **Discussion**—A bluish luminescence continues for a short period of time after termination of the photostimulating source.

radiograph—a permanent, visible image on a recording medium produced by penetrating radiation passing through the material being tested.

radiographic equivalence factor—that factor by which the thickness of a material must be multiplied in order to determine what thickness of a standard material (often steel) will have the same absorption.

radiographic inspection—the use of X rays or nuclear radiation, or both, to detect discontinuities in material, and to present their images on a recording medium.

radiographic quality—a qualitative term used to describe the capability of a radiograph to show flaws in the area under examination.

radiographic sensitivity—a general or qualitative term referring to the size of the smallest detail that can be seen on a radiograph, or the ease with which details can be seen.

radiography—the art, act, or process of making radiographs.

radiological examination—the use of penetrating ionizing radiation to display images for the detection of discontinuities or to help ensure integrity of the part.

radiology—the science and application of X rays, gamma rays, neutrons, and other penetrating radiations.

radioscopy—the electronic production of a radiological image that follows very closely the changes with time of the object being imaged.

real-time radioscopy—radioscopy that is capable of following the motion of the object without limitation of time.

recording media—material capable of capturing or storing, or both, a radiological image in digital or analog form.

recording medium—a film or detector that converts radiation into a visible image.

region of interest—a defined group of pixels from which measurements or statistics, or both, can be derived.

relevant cluster—a cluster with a cluster kernel pixel (CKP), where there are fewer than five good neighboring pixels surrounding this pixel as defined in Practice E2597. A CKP is a pixel that does not have sufficient good neighboring pixels to perform interpolation and is therefore not correctable.

relative digital image contrast—digital image contrast normalized to the average linear pixel value of the two regions of interest in a digital image.

relative image quality response (RIQR)—a means for determining the image quality performance response of a given radiological imaging system in relative comparison to the image quality response of another radiological imaging system. **Discussion**—RIQR methods are not intended as a direct measure of image quality for a specific radiographic technique application.

representative quality indicator (RQI)—an actual part or similar part of comparable geometry and attenuation characteristics to that of the test part(s), that has known or measurable features, or both, representing the facets of nonconformance for which the test part is to be examined.

saturation gray value—the maximum possible usable gray value of the DDA after offset correction. **NOTE**—Saturation may occur because of a saturation of the pixel itself, the amplifier, or digitizer, where the DDA encounters saturation gray values as a function of increasing exposure levels.

scan column dropout—a zero PV linear image artifact created parallel to the transport direction when the path of the scanner's laser beam is prevented from reaching the imaging plate, often due to an internal obstruction (contaminates, for example).

scan line integrity (or line ripple)—fluctuation of line intensity appearing perpendicular to the IP transport direction.

scanner normalization—as used in this document, scanner normalization refers to a process performed to ensure a flat field image is produced when an imaging plate is exposed without an absorber. **Discussion**—Scanner normalization procedures are dependent on the scanner model and may or may not be able to be performed by the user.

scanner slippage—the slipping of an IP in a scanner transport system resulting in fluctuations of PV or distortion of geometric linearity or both, appearing perpendicular to the IP transport direction.

scintillators and scintillating crystals—a detector that converts ionizing radiation to light.

secondary radiation—radiation emitted by any substance as the result of irradiation by the primary source.

shading—non-uniform pixel values perpendicular to the IP transport direction, which may also be caused by improper alignment of the light guide or photomultiplier tube assembly or improper scanner normalization.

shim—a material, typically placed under the IQI which is radiologically similar to the object being imaged.

signal—the data present in a radiological measurement which is directly correlated with the degree of radiation attenuation by the object being examined.

signal-to-noise ratio (SNR)—quotient of mean value of the linear pixel values and standard deviation of the mean linear pixel value (noise) in a given region of interest in a digital image.

source—a machine or radioactive material that emits penetrating radiation.

source-film distance—the distance between the radiation-producing area of the source and the film.

spatial linearity – The pixels in the image are of consistent size across the image in both axes.

specific material thickness range (SMTR)—material thickness range within which a given image quality is achieved.

SR_b image—The basic spatial resolution of the imaging system, which corresponds to the dimension of the smallest feature that can be resolved at a specified modulation and geometric magnification.
NOTE: Typical units of resolution measurement are micrometers.

SR_b detector—The basic spatial resolution of a detector, which corresponds to the dimension of the smallest feature that can be resolved at a specified modulation without geometric magnification.
NOTE: Typical units of resolution measurement are micrometers.

step wedge—a device with discrete step thickness increments used to obtain an image with discrete density step values.

step-wedge calibration film—a step-wedge comparison film the densities of which are traceable to a nationally recognized standardizing body.

step-wedge comparison film—a strip of processed film carrying a stepwise array of increasing photographic density.

step wedge comparison film—a radiograph with discrete density steps that have been verified by comparison with a calibrated step wedge film.

storage phosphor imaging plate (IP)—a photostimulable luminescent material that is capable of storing a latent radiographic image of a material being examined and, upon stimulation by a source of red spectrum light, will generate luminescence (PSL) proportional to radiation absorbed. **Discussion**—When performing computed radiography, an IP is used in lieu of a film. When establishing techniques related to source focal geometries, the IP is referred to as a detector (i.e. source-to detector-distance or SDD).

storage phosphor imaging plate—a flexible or rigid reusable detector that stores a radiological image as a result of exposure to penetrating radiation.

structure noise of DDAs—noise originating from differing properties of the individual detector elements (pixels) in a DDA.

structure noise of IPs—noise originating from physical variations in the sensitive layer and surface of an IP, which appears after scanning of the exposed imaging plate as overlaid fixed pattern noise in the digital image.

system induced artifacts—anomalies that are created by a system during the acquisition, display processing, or storage of a digital image.

system noise—the noise present in a radiological measurement resulting from the individual elements of the radiological system.

target—that part of the anode of an X-ray emitting tube hit by the electron beam.

tenth-value-layer (TVL)—the thickness of the layer of a specified substance which, when introduced into the path of a given narrow beam of radiation reduces the intensity of this radiation by a factor of ten.

tomography—any radiologic technique that provides an image of a selected plane in an object to the relative exclusion of structures that lie outside the plane of interest.

total image unsharpness—the blurring of test object features, in a radiological image resulting from any cause(s).

tube current—the current, measured in milliamperes, passing between the cathode and anode during the operation of an X-ray tube.

unsharpness—terminology used to describe an attribute of image quality associated with blurring or loss of distinction within a radiographic image. **Discussion**—Measured total unsharpness is described with a numerical value corresponding with a measure of definition (that is, distinction) associated with the geometry of exposure and inherent unsharpness of the CR system (that is, inherent or total unsharpness). Guide E94 provides fundamental guidance related to geometrical unsharpness and Practice E2002 provides a standard practice for measurement of total unsharpness.

wait time—time between end of exposure and beginning the scan of the imaging plate.

window width and level—contrast (window width) and brightness (window level) adjustment of a digital image by changing how the Gray levels translate into displayed brightness levels.