

Recommended Practice for Field Inspection of New Line Pipe

API RECOMMENDED PRACTICE 5L8
SECOND EDITION, DECEMBER 1996

REAFFIRMED, MAY 2015



AMERICAN PETROLEUM INSTITUTE

Recommended Practice for Field Inspection of New Line Pipe

Upstream Segment

API RECOMMENDED PRACTICE 5L8
SECOND EDITION, DECEMBER 1996

REAFFIRMED, MAY 2015



AMERICAN PETROLEUM INSTITUTE

FOREWORD

This recommended practice is under the jurisdiction of the API Subcommittee on Standardization of Tubular Goods.

Included in this practice are the recommended procedures for field inspection and testing of new plain-end line pipe. This recommended practice has been prepared specifically to address the practices and technology used in field inspection of line pipe, and certain parts are not suitable or appropriate for mill inspections.

The recommended practices established within this document are intended as an inspection and/or testing guide, and nothing in this guide shall be interpreted to prohibit the agency or owner from using personal judgment, supplementing the inspection with other techniques, extending existing techniques, or reinspecting certain lengths.

This recommended practice covers the qualification of inspection personnel, a description of inspection methods, apparatus calibration, and standardization procedures for various inspection methods. The evaluation of imperfections and marking of inspected new line pipe are included.

This document shall be used as a guide applicable to the methods for field inspection and shall not be used as a basis for acceptance or rejection. Acceptance or rejection of new API monogrammed line pipe shall be based on conformance with API Specification 5L.

This practice shall become effective on the date printed on the cover but may be used voluntarily from the date of distribution.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to assure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any federal, state, or municipal regulation with which this publication may conflict.

Suggested revisions are invited and should be submitted to the director of the Exploration and Production Department, American Petroleum Institute, 1220 L Street, N.W., Washington, D.C. 20005.

CONTENTS

	Page
1 SCOPE AND APPLICATION.....	1
1.1 Basis for Inspection.....	1
1.2 Applicability of Inspections.....	1
1.3 Repeatability of Results.....	1
1.4 Consequences of Variability.....	2
2 REFERENCES.....	2
3 DEFINITION OF TERMS.....	2
4 QUALITY ASSURANCE.....	9
5 QUALIFICATION OF INSPECTION PERSONNEL.....	9
5.1 Scope.....	9
5.2 Written Procedure.....	9
5.3 Qualification of Inspection Personnel.....	9
5.4 Training Programs.....	9
5.5 Examinations.....	10
5.6 Experience.....	10
5.7 Requalification.....	10
5.8 Documentation.....	10
5.9 NDT Personnel Certification.....	10
6 GENERAL INSPECTION PROCEDURES.....	10
6.1 Scope.....	10
6.2 Pre-inspection Procedures.....	10
6.3 Records and Notification.....	11
6.4 Post-inspection Procedures.....	11
7 ACCEPTANCE CRITERIA, DISPOSITION, AND RESPONSIBILITY.....	11
7.1 Scope.....	11
7.2 Basis for Acceptance.....	11
7.3 Responsibility for Rejections.....	11
8 VISUAL AND DIMENSIONAL INSPECTION.....	12
8.1 Scope.....	12
8.2 Application.....	12
8.3 Equipment (including calibration).....	12
8.4 External Surface Illumination.....	12
8.5 Internal Surface Illumination.....	12
8.6 Full-Length Visual Inspection of Line Pipe (FLVI).....	13
8.7 Diameter and Bevel Check on Pipe Ends.....	13
9 HARDNESS TESTING.....	14
9.1 Scope.....	14
9.2 Application.....	14
9.3 Equipment.....	14
9.4 Calibration and Standardization.....	14
9.5 Procedures.....	15

	Page
10 MAGNETIC PARTICLE INSPECTION (MPI)	15
10.1 Scope	15
10.2 Application	15
10.3 Equipment, Materials, and General Procedures	15
10.4 Calibration and Standardization.....	17
10.5 Procedures for Inspection of Longitudinal Welds, Inside and Outside Surface (FLMPIW, FLMPOW)	18
10.6 Full Body Inspection, Inside and Outside Surface	18
10.7 End Area Inspection (EAI)	19
11 ELECTROMAGNETIC INSPECTION.....	19
11.1 Scope	19
11.2 Application	19
11.3 Equipment	19
11.4 Calibration and Standardization.....	19
11.5 Inspection Procedures	21
12 RESIDUAL MAGNETISM AND DEMAGNETIZATION	22
12.1 Scope.....	22
12.2 Application	22
12.3 Demagnetization Services.....	22
13 GAMMA RAY WALL THICKNESS MEASUREMENT.....	22
13.1 Scope.....	22
13.2 Application	23
13.3 Equipment.....	23
13.4 Calibration and Standardization.....	23
13.5 Inspection Procedure	23
14 ELECTROMAGNETIC GRADE COMPARISON.....	23
14.1 Scope	23
14.2 Application	23
14.3 Equipment	23
14.4 Calibration and Standardization.....	23
14.5 Inspection Procedure	24
15 ULTRASONIC INSPECTION.....	24
15.1 Scope.....	24
15.2 Application	24
15.3 General Procedures for Calibration, Standardization, and Inspection	24
15.4 Ultrasonic Inspection of Pipe Welds (UTW)	25
15.5 Inspection of the Pipe Body for Wall Thinning and Planar Imperfections (UTBL).....	26
15.6 Inspection of the Pipe Body for Longitudinal, Transverse, and Oblique Imperfections (UTBLTO)	27
15.7 Inspection of Pipe Ends for Laminations (UTLE).....	28
15.8 Manual Ultrasonic Thickness Gauging.....	29
16 EVALUATION OF IMPERFECTIONS AND DEVIATIONS	30
16.1 Scope.....	30
16.2 Application.....	30
16.3 Equipment	30

	Page
16.4 Calibration and Standardization Procedures	30
16.5 Procedure for Evaluating Pipe Body Imperfections	31
16.6 Procedure for Evaluating Welds	32
16.7 Procedure for Evaluating Mill Grinds	33
16.8 Procedure for Evaluating Wall Reduction	33
16.9 Procedure for Evaluating Subsurface Imperfections in Welds	33
16.10 Procedure for Evaluating Dents.....	34
16.11 Procedure for Evaluating Hard Spots.....	34
16.12 Procedure for Evaluating Arc Burns	34
16.13 Procedure for Evaluating Laminations and Inclusions	34
16.14 Procedure for Evaluating Bent Pipe	35
16.15 Procedure for Evaluating Diameter	35
16.16 Procedure for Evaluating Bevel, Face, Taper, and Squareness.....	35
17 MARKING.....	35
17.1 Scope.....	35
17.2 Authority	35
17.3 General Guidelines	35
17.4 Marking of Prime Line Pipe	36
17.5 Marking of Line Pipe with an Imperfection of Undetermined Depth.....	36
17.6 Marking of Conditioned Line Pipe.....	36
17.7 Marking of Conditionable Line Pipe.....	36
17.8 Marking of Nonconditionable Line Pipe.....	38
APPENDIX A—ORDERING INFORMATION	39
Figures	
1—Ultrasonic Reference Standard Example for Supplementary Practice	
15.4.2.2.b	26
2—Inspection Marking of New Line Pipe.....	37
Tables	
1—Field Inspections Available	1
2—Summary of New Line Pipe Inspection Identification Bands	36

Recommended Practice for Field Inspection of New Line Pipe

1 Scope and Application

1.1 BASIS FOR INSPECTION

This document contains practices recommended for use in the inspection of new line pipe subsequent to production by the manufacturer. Appendix A contains ordering information for owners desiring to order inspection of new pipe per this document. The basis for performing an inspection may have its origin either in API Specification 5L or in a supplemental specification or contract prepared by the owner. The inspections represented by the practices may be placed in one of three categories as follows:

- Inspections specified in API Specification 5L.
- Inspections specified as one of several options in API Specification 5L.
- Inspections not specified in API Specification 5L.

1.2 APPLICABILITY OF INSPECTIONS

1.2.1 Some of the practices contained in this recommended practice are applicable to pipe regardless of size or type. Other practices typically may have limited applicability. Table 1 indicates those inspections that are available in the field and covered by this recommended practice in relation to pipe type. It is the owner's responsibility to specify which inspections are to be used when completing the ordering information (see Appendix A) to accompany an inspection contract.

1.3 REPEATABILITY OF RESULTS

1.3.1 Sources of Variation

Every inspection and measurement process is characterized by an inherent variability of results. The nondestructive inspections and measurements included in this recommended practice are characterized by additional inherent variability attributable to the following factors:

- API Specification 5L permits options in the selection of practices to be used in the inspection for specific attributes.
- Within a single practice, API Specification 5L permits options in the selection of calibration standards.
- Each manufacturer of nondestructive inspection systems uses different mechanical and electronic designs.
- Certain practices in this recommended practice are based on operation of the system at high, and even maximum, sensitivity without the use of the reference standards specified in API Specification 5L.
- Within the performance capability of a single nondestructive inspection system installation, there will not be perfect repeatability of results.
- API Specification 5L contains provisions for a number of uses of radiological inspection of double submerged arc

welds (DSAW) pipe, which are neither contained nor specifically referenced in this recommended practice. The possibility exists that material classified as rejected using practices in this recommended practice may have been inspected and classified prime by the manufacturer using radiological inspection or reinspection procedures in compliance with API Specification 5L.

Table 1—Field Inspections Available

Inspection (see Note 1 below)	Pipe Type (see Notes 2 and 3 below)			
	CW	SMLS	EW	AW
FLVI	All	All	All	All
DBE	All	All	All	All
Hardness	All	All	All	All
FLMPIW	N	N.A.	All	All
FLMPOW	N	N.A.	All	All
FLMPI	N	All	All	All
FLMPO	N	All	All	All
EAI	All	All	All	N
EMI	EQ	EQ	EQ	N
Residual magnetism	All	All	All	All
Gamma wall thickness	N	All	All	N
Grade comparison	N	All	All	N
UTBL	N	All	All	N
UTBLTO	N	EQ	EQ	N
UTW	N	N.A.	All	All
UTLE	N	All	All	All
Hand-held UT gauging	All	All	All	All

Note 1: Key to inspection abbreviations:

DBE	Diameter and bevel check, pipe ends
EAI	End area inspection
EMI	Electromagnetic inspection
FLMPI	Full-length magnetic particle, inside surface
FLMPIW	Full-length magnetic particle, inside weld
FLMPO	Full-length magnetic particle, outside surface
FLMPOW	Full-length magnetic particle, outside weld
FLVI	Full-length visual inspection
UTBL	Ultrasonic body laminations and wall thickness
UTBLTO	Ultrasonic body longitudinal, transverse, oblique
UTLE	Ultrasonic lamination check, pipe ends
UTW	Ultrasonic inspection, weld only

Note 2: Key to pipe types:

AW	Arc-welded pipe
CW	Continuous-welded pipe (butt-welded)
EW	Electric-welded pipe
SMLS	Seamless pipe

Note 3: Key to applicability of inspections:

All	Inspection may be applicable throughout the diameter range.
EQ	Inspection may be applicable throughout the diameter range subject to equipment limitations.
N	Inspection usually is not applicable for this type pipe.
N.A.	Not applicable because there are no welds in seamless pipe.

1.4 CONSEQUENCES OF VARIABILITY

1.4.1 Disposition

For any of the reasons given in 1.3.1, the results of field inspection may not duplicate corresponding inspections performed during manufacture. Variability within and among the results of practices contained in the recommended practice is to be expected. When field inspection results in the classification of pipe as other than prime, it shall not be presumed that the material is defective until an evaluation has been performed in accordance with Section 16, to establish final disposition.

1.4.2 Responsibility For Rejections

In some cases, a pipe inspected using practices described in this recommended practice may be classified as a reject, even though it was inspected in conformance with API Specification 5L and classified as an acceptable pipe in conformance with API Specification 5L by the manufacturer. Responsibility for a rejection shall be based on the acceptance criteria contained in API Specification 5L or on an additional or more restrictive criteria previously negotiated with the manufacturer. Under no circumstances will the results of field nondestructive inspection stand alone as a basis for rejection without corroborating evidence that the material is properly classified as defective based on the appropriate evaluation(s) performed in accordance with Section 16 of this recommended practice. In case disposition is disputed between the purchaser and the manufacturer, the provisions of H.4 of API Specification 5L shall apply.

2 References

This recommended practice includes by reference, either in total or in part, other API, industry standards listed below. The latest edition of these standards should be used unless otherwise noted below:

API	
Spec 5L	<i>Line Pipe</i>
Bull 5T1	<i>Imperfection Terminology</i>
ASNT ¹	
SNT-TC-1A	<i>Personnel Qualification and Certification in Nondestructive Testing</i>
ASTM ²	
E 110	<i>Indentation Hardness of Metallic Materials by Portable Hardness Testers</i>

¹American Society for Nondestructive Testing, 4153 Arlingate Plaza, Columbus, Ohio 43228-0518.

²American Society of Testing and Materials, 100 Bar Harbor Drive, West Conshohocken, Pennsylvania 19428.

3 Definition of Terms

The following terms are frequently used in the field inspection of new line pipe:

3.1 AC field: The active magnetic field produced by the use of alternating current.

3.2 agency: The entity contracted to inspect new line pipe using the methods and criteria specified.

3.3 alternating current (AC): Current that reverses its direction of flow at regular intervals.

3.4 ampere (A or amp): A unit of electrical current.

3.5 ampere-turns (A-t): The product of the number of turns in a coil and the number of amperes of current flowing through it. This is a measure of the magnetizing strength of the coil. For example: 800 amperes in a 6-turn coil = 4800 A-t.

3.6 angle beam: A term used to describe an angle of incidence or refraction other than normal to the surface of the test object. This includes shear waves and longitudinal (compression) waves.

3.7 API: American Petroleum Institute.

3.8 arcing: Current flow through a gap, often accompanied by intense heat and light.

3.9 artificial discontinuity: See *reference reflector*.

3.10 ASNT: American Society for Nondestructive Testing.

3.11 ASTM: American Society for Testing and Materials.

3.12 back reflection: In ultrasonic testing, the signal received from the back surface of the pipe wall.

3.13 backscatter: Secondary radiations resulting from the interaction between the primary gamma radiations from the source and the pipe wall.

3.14 bevel: On plain-end line pipe, the angle (excluding a right angle) to which the end is finished, measured from a line drawn perpendicular to the axis of the pipe.

3.15 bevel gauge: The term applied to any instrument which may be used to measure the pipe and bevel angle. Bevel gauges may be template-type gauges with fixed angles or adjustable protractor-type gauges.

3.16 black light: A colloquial expression used to describe long wave ultraviolet light (UV-A). See *ultraviolet light*.

3.17 borescope: A long optical instrument with an illuminating lamp for inspecting the inside surface of a pipe.

3.18 butt-weld pipe: See *continuous weld pipe*.

3.19 calibration: The adjustment of instruments, prior to use, to a known basic reference often traceable to the National Institute of Standards and Technology.

3.20 cathode ray tube (CRT): A vacuum tube with a luminescent screen often used for viewing ultrasonic echo signals or for video readouts of computer stored data.

3.21 central conductor (shooting rod): A conductor that is passed through the pipe, for the purpose of creating a circular or circumferential magnetic field in the pipe. This term does not imply that the current rod must be centered in the pipe.

3.22 chock: Block or wedge used beneath a length of pipe so that it cannot roll.

3.23 circular (circumferential) magnetic field: The magnetic field in or surrounding a current-carrying conductor or pipe with an interior current-carrying rod.

3.24 circular (circumferential) magnetization: Circular magnetization is the production of a magnetic field in a pipe wall such that the magnetic field is oriented circumferentially.

3.25 circumferential magnetization: See *circular magnetization*.

3.26 classification: The action taken to categorize a length of new line pipe based on conformance with the contracted inspection requirements.

3.27 coating: A nonmetallic material bonded to the external or internal surface of the pipe. External coatings are normally applied for corrosion protection purposes while internal coatings are usually applied for corrosion protection or to improve flow efficiency. Pipe may have a chemical conversion coating that is used to retard rust during storage or shipment.

3.28 coil method: A method of magnetizing in which pipe is encircled by a current-carrying coil.

3.29 coil shot: A short pulse of magnetizing current passed through a coil surrounding a pipe for the purpose of longitudinal magnetization.

3.30 cold expanded pipe: Pipe in which the final diameter is attained by either internal mechanical or hydraulic expansion of the pipe.

3.31 color code: Paint band identification of pipe classification in accordance with appropriate specifications.

3.32 contact method (current flow method): A method of magnetizing pipe by passing a current through its wall via prods or hand-held contacts.

3.33 continuous method: A method of searching for flaws while the magnetizing current is being applied.

3.34 continuous weld pipe: Pipe having one longitudinal seam formed by mechanical pressure to make the

welded junction, the edges being furnace heated to the welding temperature prior to welding.

3.35 contour (verb): The gradual tapering by filing or grinding to prevent abrupt changes in the wall thickness.

3.36 contract: The documented agreement that specifies the terms of the inspections to be performed.

3.37 controlled area: A defined area in which the occupational exposure of personnel to radiation or to radioactive material is under the supervision of an individual in charge of radiation protection. (This implies that a controlled area is one that requires control of access, occupancy, and working conditions for radiation protection purposes.)

3.38 couplant: A material (usually a liquid) used between an ultrasonic transducer and the test specimen to conduct ultrasonic energy between them.

3.39 CRT: See *cathode ray tube*.

3.40 DC field: Either a residual magnetic field or an active magnetic field produced through the use of direct current.

3.41 dead zone (ultrasonic): The distance from the front surface of the pipe to the nearest inspectable depth.

3.42 defect: An imperfection of sufficient magnitude or properties to warrant rejection of the pipe, based on the stipulations of the latest edition of the applicable specification(s).

3.43 demagnetization: The process of removing part or all of the existing residual magnetism from the pipe.

3.44 detect: The act of locating a flaw or imperfection.

3.45 detector or detector shoe: A scanning shoe carrying one or more transducers. It is used to protect transducers from mechanical damage from the pipe surface, and so forth.

3.46 diameter tape: A measuring device consisting of a thin, flexible, metallic tape that can be wrapped around the circumference of the pipe and is graduated such that pipe diameter can be directly read from the scale. A diameter tape is also referred to as pi tape.

3.47 differential wiring: Coils electrically connected in opposed series such that the output of one coil effectively opposes the other coil. In search coils, the differential wiring results in equal and opposite voltages being developed when the magnetic field changes equally in each coil. Thus, no net voltage output is produced.

3.48 diffuse indications (magnetic particle): Indications that are not clearly defined as, for example, indications of subsurface imperfections.

3.49 direct current (DC): Refers to an electric current flowing continually in one direction only through a conductor.

3.50 discontinuity: An irregularity in the pipe such as laps, seams, pits, and laminations. Also called a flaw or imperfection.

3.51 disposition: The action taken in conformance with API Specification 5L with regard to a defect in a length of new line pipe. The defect may be removed, weld repaired, cut off or rejected. See 9.7.5.4 of API Specification 5L for restrictions.

3.52 dose rate: The amount of ionizing radiation energy absorbed per unit of mass and time of irradiated material. Measured in reps, rem, or rad.

3.53 dosimeter: A device that measures radiation dose, such as a film badge or ionization chamber.

3.54 double extra strong: A schedule of wall thicknesses for different sizes of pipe. It is abbreviated as XXS.

3.55 double random length (DRL): A term denoting the length of a pipe. In a shipment of pipe of double random lengths, the minimum average length for each order item is 35 feet.

3.56 double seam arc welded pipe: Pipe having two longitudinal seams formed by the submerged arc welding process or the gas metal arc-welding process or a combination of both processes. Location of seams are approximately 180 degrees apart.

3.57 DRL: Abbreviation for double random length.

3.58 DSAW: Abbreviation for double submerged arc weld (single seam).

3.59 dry method: A magnetic particle inspection method in which the particles employed are in dry powder form.

3.60 dual transducer: An ultrasonic probe containing two piezoelectric crystals, one for transmitting and one for receiving.

3.61 eddy current: Circulating current caused to flow in the pipe by varying magnetic fields.

3.62 electric-weld pipe: Pipe having one longitudinal seam formed by electric resistance welding (ERW) or electric induction welding without the addition of extraneous (filler) metal.

3.63 electromagnet (EM): When ferromagnetic material is surrounded by a current carrying coil, it becomes magnetized and is called an electromagnet.

3.64 electromagnetic inspection: A general term including primarily the eddy current and flux leakage methods for the detection of imperfections. Field electromagnetic

inspection systems may include equipment for performing additional inspections or services.

3.65 encircling coil: A coil surrounding the pipe being tested.

3.66 end effect: The reduction in magnetization near the ends of a length of magnetized pipe due to the demagnetizing effect of the poles at the pipe ends.

3.67 ERW: An abbreviation for electric resistance welding.

3.68 evaluation: Process of determining the severity of an imperfection which leads to determining whether the pipe is acceptable or rejectable under the appropriate specification.

3.69 extra strong: A schedule of wall thicknesses for different sizes of pipe. It is abbreviated as XS.

3.70 false indication: An indication that may be interpreted erroneously as an imperfection or defect. An irrelevant indication. Sometimes called artifact.

3.71 ferromagnetic: A term applied to materials that can be magnetized or strongly attracted by a magnetic field.

3.72 film badge: A package of photographic film worn like a badge by some workers in the inspection industry to measure exposure to ionizing radiation. The absorbed dose can be calculated by the degree of film-darkening caused by the irradiation.

3.73 fluorescence: The emission of visible radiation by a substance as the result of the absorption of ultraviolet light radiation.

3.74 fluorescent magnetic particle inspection: The magnetic particle inspection process employing a finely divided fluorescent ferromagnetic inspection medium that fluoresces when activated by ultraviolet light (3200 to 4000 angstroms).

3.75 flux density: The strength of a magnetic field expressed in flux lines per unit area, that is, gauss, kilogauss.

3.76 flux leakage: This is the magnetic field forced out into the air by a distortion of the field within the pipe caused by the presence of a discontinuity.

3.77 flux lines: Imaginary magnetic lines used as a means of explaining the behavior of magnetic fields. The conception of flux lines is based on the pattern of lines produced when iron filings are sprinkled on a piece of paper laid over a magnet. Synonymous with magnetic lines of force.

3.78 frequency (Hz): Number of complete cycles of a wave motion per second of time. Unit of measure is called hertz.

3.79 full body: This term refers to inspection coverage of the entire surface area of the pipe within the limitations of the inspection equipment used. For example, EMI equipment normally does not provide coverage of 6 to 12 inches on each pipe end.

3.80 furring: Buildup or bristling of magnetic particles at the ends of a longitudinal magnetized pipe, that is, at its poles.

3.81 gain control: A sensitivity adjustment on an amplifier or circuit.

3.82 gamma rays: High-energy, short-wave-length electromagnetic radiation emitted by a nucleus. Energies of gamma rays are usually between 0.010 and 10 Mev. Gamma rays are penetrating and are best attenuated by dense material like lead or tungsten.

3.83 gas metal-arc welded pipe: Pipe having one longitudinal seam formed by continuous gas-metal arc welding. At least one pass is made inside the pipe and at least one pass is made from the outside of the pipe.

3.84 gauss (G): This is the unit of flux density or induction. Numerically, one gauss is one line of flux per square centimeter of area.

3.85 gaussmeter: See magnetometer.

3.86 grind, probe: An exploratory grind made to determine the depth of an imperfection.

3.87 grind, radius: Grinding performed to remove sharp edges and/or abrupt changes in the wall thickness around exploratory grinds or imperfections.

3.88 grind, removal: A grind made to remove a questionable imperfection and to make the product comply with the appropriate specification (see API Specification 5L, 9.7.5.4).

3.89 grinding: Removing material from a pipe surface by abrading, for example, by grinding wheel or file.

3.90 handling damage: Cuts, gouges, and dents that occurred during handling (loading, unloading, shifts in transit, and so forth).

3.91 hardness: A measure of the hardness of a metal, as determined by pressing a hard steel ball or diamond penetrator into a smooth surface under standard conditions. Results are often expressed in terms of Rockwell hardness number (HRB or HRC) or Brinell hardness number (BHN). Refer to ASTM E10, ASTM E18, and ASTM E110 for added information.

3.92 hardness value (hardness testing): The average of the valid readings taken in the test area.

3.93 ID: Inside diameter.

3.94 imperfection: A discontinuity or irregularity in the product, sometimes called a flaw. For exact definitions and illustrations of specific imperfections, see API Bulletin 5T1.

3.95 indication: A response from nondestructive inspection that requires interpretation in order to determine its significance, (for example, a blip on the log or a powder buildup on the pipe).

3.96 indicator (or readout): A device for displaying a condition, current, or potential. Typical ones used on inspection instruments are galvanometers, De Arsenval (dial) or digital meters, CRTs, or warning lights.

3.97 induction: The magnetism induced in a ferromagnetic body by an outside magnetizing force.

3.98 inspection: The process of examining materials and pipes for possible defects or for deviation from established standards.

3.99 inspection job: The inspection of one or more lots of pipe by an agency subject to a single contract or subcontract as appropriate.

3.100 inspector: An employee of an agency qualified and responsible for one or more of the inspections or tests specified in the contract.

3.101 interpretation: The process of determining the nature of an indication.

3.102 ionization chamber: An instrument that detects and measures ionizing radiation by observing the electrical current created when radiation ionizes gas in the chamber, making it a conductor of electricity.

3.103 jointer: A length of pipe made up of two shorter pieces of pipe.

3.104 land: See *root face*.

3.105 leakage field: The magnetic field forced out of the material into the air by distortion of the field within the material caused by the presence of a discontinuity.

3.106 length: A complete section of pipe (colloquial term is *joint*).

3.107 licensed material: Radiation source material possessed, used, or transferred under license issued by the appropriate government agency.

3.108 lift-off: The perpendicular distance between detector shoe and pipe surface; sometimes called *standoff*.

3.109 line pipe: Pipe used for conveyance in the oil, chemical, and natural gas industries.

3.110 log: The strip chart record or readout of the detected imperfections in the pipe being inspected by EMI or other electronic inspection equipment.

3.111 longitudinal magnetic field: Magnetization of a material in such a way that the magnetic flux runs substantially parallel to the axis of the pipe.

3.112 longitudinal imperfection: An imperfection that has its principal direction or dimension approximately in the longitudinal direction.

3.113 loss of back reflection (ultrasonic): Absence of, or a significant reduction in, an indication from the back surface of the article being inspected.

3.114 magnetic field: The space around a magnet within which ferromagnetic materials are attracted.

3.115 magnetic particle field indicator: A device containing artificial flaws that is used to verify the adequacy or direction, or both, of a magnetic field.

3.116 magnetic particles: Finely divided ferromagnetic material capable of being individually magnetized and attracted to distortions in a magnetic field.

3.117 magnetic poles: The area on a magnetized pipe where the magnetic field is "leaving or returning," usually at its end when longitudinally magnetized.

3.118 magnetism: The ability of a magnet to attract or repel another magnet. Also recognized as a force-field surrounding conductors carrying electric current.

3.119 magnetizing force: The total force tending to set up a magnetic field in a magnetic circuit divided by its length. It is usually designated by the letter H and the unit is the oersted.

3.120 magnetometer: Either a mechanical or electronic instrument for measuring magnetic field strength. An electronic magnetometer is also known as a gaussmeter.

3.121 magnetomotive force (mmf): The product of the current and the number of turns in a current carrying coil.

3.122 manufacturer: The entity last responsible for manufacturing compliance with API Specification 5L and for selling the pipe to the purchaser.

3.123 marking: The assorted marks on tubular products. Includes inspection markings made with paint sticks and stencils and ball-point paint tubes.

3.124 may: A term used to indicate that a provision is optional.

3.125 mill grind: An area of the pipe surface removed by grinding during the manufacturing process.

3.126 mill scale: An oxide of iron that forms on the surface of hot steel.

3.127 monitoring radiation: Periodic or continuous determination of the amount of ionizing radiation present in a region.

3.128 MPI: Abbreviation for magnetic particle inspection.

3.129 nondestructive evaluation (NDE): Same as nondestructive testing.

3.130 nondestructive testing (NDT): Inspection to detect internal, surface, and concealed defects or imperfections in materials using techniques that do not damage or destroy the items being tested.

3.131 normal beam: A vibrating pulse wave train traveling normal to the test surface.

3.132 notch: See *reference reflector*.

3.133 oblique imperfection: An imperfection at an angle other than longitudinal or transverse.

3.134 OD: Outside diameter. Often used as an abbreviation for outside surface.

3.135 owner: The entity who has ownership of the new line pipe at the time inspection is contracted, specifies the type of inspection or testing to be conducted and authorizes its performance. The owner may be the purchaser.

3.136 penetrometer (radiography): In radiography, a device used to determine the sensitivity of a radiographic image. There are many types of penetrometers in radiography ranging from thin wires to step wedges, but the usual form consists of a flat strip (preferably of the same material as the specimen), with its thickness a fixed percentage of the specimen thickness and with small holes whose diameter bear fixed ratios to the penetrometer thickness.

3.137 permeability: (1) The ease with which material can become magnetized; (2) the ratio of flux density produced to magnetizing force, that is, B/H .

3.138 permanent magnet: A magnet or body that retains a strong residual magnetic field.

3.139 personnel monitoring equipment: Device designed to be worn or carried by an individual for the purpose of measuring the radiation dose received (for example, film badges, pocket dosimeters, film rings, and so forth).

3.140 pipe: In this document, refers to line pipe.

3.141 plain-end: For line pipe, this term refers to the preparation on each end of the pipe and, depending on the pipe size and type or how the purchaser specifies, can be either square cut or with a bevel.

3.142 planar: This term refers to an imperfection in one geometric plane that is normally parallel to, and within, the outer and inner pipe surfaces.

3.143 pole: The area of a magnetized pipe where a magnetic field is leaving or returning.

3.144 pole piece: The ferromagnetic portion of a magnetic circuit attached to the core used to shape and direct the