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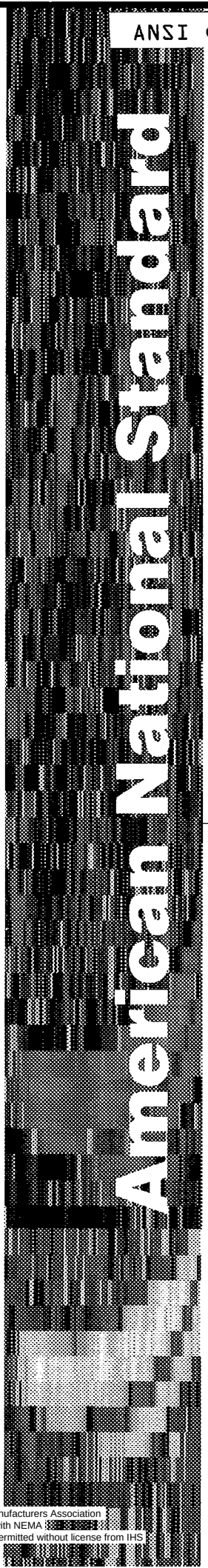

for Electric Lamps – Projection Lamps – Vocabulary

ANSI C78.1452-1991

ANSI American National Standards Institute
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ANSI®
C78.1452-1991

American National Standard
for Electric Lamps –

Projection Lamps – Vocabulary

Secretariat

National Electrical Manufacturers Association

Approved August 9, 1991

American National Standards Institute, Inc.

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Foreword (This foreword is not part of American National Standard C78.1452-1991.)

In the work of Subcommittee C78-5 on Stage, Studio and Photographic Lamps to publish standards covering a broader spectrum of photographic lamp types, the need for better definitions became apparent. Questions from user representatives prompted concrete action on a vocabulary. This first edition, C78.1452-1991, has received considerable study in the attempt to provide correct definitions and guidance toward preferred terminology.

Suggestions for improvement of this standard will be welcome. They should be sent to the Secretary of the C78 Committee, National Electrical Manufacturers Association, 2101 L Street, NW, Washington, DC 20037.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee C78 on Electric Lamps. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the C78 committee had the following members:

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American National Standard for Electric Lamps –

Projection Lamps – Vocabulary

1 Scope

This standard provides definitions for a wide range of terms used in the design, manufacturing, and application of photographic lamps. It serves as a common reference for all ANSI lamp standards in the C78.1400 series, thus reducing the number of terms that need to be defined in individual standards. With strong input from the consumer or user side, this standard covers many terms in use by the laity.

Where appropriate, terms have been adopted from more primary sources; IEC Publication 50 (845), ANSI/IES RP-16.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI C78.370-1982 (R1989), *Method for the designation of photo lamps*

ANSI C78.379-1983, *Method for the classification of the beam patterns of incandescent and high-intensity discharge reflector lamps* [1)]

ANSI C78.1401-1975 (R1987) – ANSI C78.1426-1991; and ANSI C78.1460-1991[2)] *series of standards on photographic lamps*

ANSI C78.1450-1983 (R1989), *Electric lamps – Incandescent projection lamps – Method for life testing*

ANSI C78.1451-1988, *Electric lamps – Use of protective shields with tungsten-halogen lamps – Cautionary notice*

ANSI C82.9-1988, *High intensity discharge and low pressure sodium lamps, ballasts and transformers – definitions*

ANSI/IEEE 100-1988, *Dictionary of electrical and electronics terms*

ANSI/IES RP-16-1986, *Nomenclature and definitions for illuminating engineering*

ANSI/UL 122-1988, *Photographic equipment*

IEC Publication 50(845), *International electrotechnical vocabulary, chapter 845: lighting* [3)]

3 Definitions

3.1 abnormal failure: A premature failure of a lamp due to extreme thermal, electrical, or mechanical shock or manufacturing defect.

3.2 air leak: See *leaker.*

3.3 ambient temperature: The temperature of the surrounding atmosphere.

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1) This standard is currently undergoing revision. Contact the secretariat for more information.
2) At the time of publication, this standard was undergoing the publication procedure. Contact the secretariat for more information.
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3.4 angstrom: Unit of length equal to 10^{-10} meter, formerly used to express wavelength of visible light.

3.5 ANSI: Abbreviation for American National Standards Institute. Formerly known as USASI, ASI, and ASA.

3.6 aperture:

a) The opening of a lens (usually diameter) that admits and transmits light.

b) The opening (usually dimensions) of the illuminated area of a film or slide being projected.

See *relative aperture* and *effective aperture.*

3.7 arc lamp: An electric lamp which produces light energy by passing electric current through ionized gas or metal vapor.

3.8 aspect ratio: The ratio of one dimension to the other dimension of a rectangular photographic format or projected image.

3.9 atmospheric energy: See *contained atmospheric energy.*

3.10 average rated life: See *rated life.*

3.11 ballast: A device that, by means of resistance, inductance, capacitance or electronic elements, singly or in combination, controls the current, voltage, and waveform to the proper values for starting and operation of lamps.

3.12 base: That part of a lamp to which the electrical connections are made. In many cases it also forms the mechanical support of the lamp.

NOTES

1 The base is usually defined by its IEC designation.

2 The term "cap" is used internationally.

3.13 base temperature: See *maximum base temperature.*

3.14 basing cement: Cement used to attach the bulb to the base of a lamp. May also indicate the cement used to attach a reflector to a lamp.

3.15 bayonet base: A base with small pins on its shell which engage in slots in a lampholder.

3.16 bayonet socket: A lampholder for a bayonet-based lamp.

3.17 beam: A cone of light emanating from a lighting device.

3.18 beam lumens: The total luminous flux in that region of space where the intensity exceeds 50% of the maximum intensity.

3.19 beam spread (beam angle): The angle between the two directions in the plane in which the intensity is equal to a stated percentage of the maximum beam intensity. See ANSI C78.379.

3.20 BHLR: Abbreviation for Bell and Howell Large Ring; a lamp-base configuration presently called "large indexing ring".

3.21 bi-pin: A generic term referring to all lamp bases with two pins.

3.22 bi-post: A generic term referring to all lamp bases with two posts.

NOTE – The terms pin or post may be used interchangeably, but a post is a larger pin.

3.23 blackening: The result of tungsten from the filament depositing on the inside wall of the bulb or enclosure.

3.24 blister: A bulge on the wall of a lamp bulb due to overheating of that area.

3.25 blow: Common layperson term to describe sudden failure of the lamp filament.

3.26 brightness: Attribute of visual sensation according to which an observed area appears to emit more or less light. See *luminance.*

3.27 bulb: Transparent or translucent gastight envelope enclosing the luminous element.

3.28 bulb temperature: Expressed in degrees Celsius minimum or maximum, or both, applying to any area of the bulb which may experience limiting service temperature.

3.29 burning position: See *operating position.*

3.30 button: See *eyelet.*

3.31 C: Abbreviation for a single coil as used in various filament configurations.

3.32 CAE: Abbreviation for contained atmospheric energy.

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3.33 candela: The SI unit of luminous intensity. One candela is one lumen per steradian. Formerly, *candle.*

NOTE – Candela per square meter is the International Standard (SI) unit of luminance.

3.34 candlepower (CP): Luminous intensity expressed in candelas. A term that is sometimes used in place of *intensity.*

3.35 cap: See *base.*

3.36 cautionary notice: A notice placed on or with a lamp, or on the lamphouse, to warn the operator or person changing the lamp that a potential hazard may exist.

3.37 CBCP: Abbreviation for center beam candlepower. Beam power expressed in candelas and measured at the center of the intended direction and distribution of light.

3.38 CC: Abbreviation for coiled-coil as used in various filament configurations.

3.39 chromaticity of a color: The dominant or complementary wavelength and purity aspects of a color taken together. Also the aspects specified by the chromaticity coordinates of the color taken together.

3.40 code: See *designation.*

3.41 coiled-coil filament: Helical filament wound into a larger helix.

3.42 cold mirror: An interference filter which reflects visible radiation but transmits infrared radiation.

3.43 collector: A metal plate or grid placed inside a lamp near the filament and designed to collect evaporated tungsten rather than have it deposit on the bulb wall.

3.44 color temperature: See *correlated color temperature.*

3.45 condenser lens: The lens(es) in a projection system which directs light from the lamp into the gate or film aperture and into the projection lens.

3.46 condensing mirror: A curved mirror that collects and directs light and functions similarly to a condenser lens. A mirror with a curved surface that is an essential component in an illumination system.

3.47 contained atmospheric energy (CAE): A computation of the energy represented by the volume and pressure of the gases within a projection lamp. Ordinarily applied only to high pressure arc lamps. CAE = 0.15 (PC-PE)V; where PC = contained pressure in atmospheres, PE = external pressure in atmospheres, V = volume in cubic centimeters. See ANSI/UL 122.

3.48 convection: Cooling by natural means rather than with a fan.

3.49 corner to center ratio (C/C): The ratio of the average corner illumination value to the center illumination value. It is commonly expressed as a percentage.

3.50 correlated color temperature (Unit: kelvin, K): The absolute temperature of a blackbody whose chromaticity most nearly resembles that of the light source.

3.51 CP: Abbreviation for candlepower.

3.52 DC: Abbreviation for double contact.

3.53 designation: The three letter symbol assigned by the ANSI Lamp Designation Program Administrator to a specific lamp in accordance with ANSI C78.370.

3.54 devitrification: A change of state in quartz from a transparent to a minutely crystalline state which reduces strength and integrity; often due to a combination of surface contaminants and high temperature, and evidenced by a diffuse etched appearance.

3.55 dichroic filter: A filter consisting of:

– Isotropic materials that selectively reflect and transmit radiant flux as a function of wavelength;

– Anisotropic materials that selectively absorb one plane of polarization of incident radiant flux while transmitting the normal plane of polarization as in a polarization filter.

3.56 dichroic reflector: A reflector used in conjunction with a lamp that effectively transmits infrared energy and reflects visible light.

3.57 DICH: Abbreviation for dichroic.

3.58 dimmer: An electrical device used to control power to lamps in a lighting installation in order to adjust the level of the illuminance.

3.59 diode: An electrical device that permits current to flow in only one direction. Often called a *rectifier.*

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3.60 discharge lamp: Lamp in which the light is produced, either directly or by means of phosphors, by an electric discharge through a gas, a metal vapor, or a mixture of several gases and vapors.

3.61 double branding or dual coded lamp: A lamp carrying two ANSI designations.

3.62 double contact (DC): A base or a lamp with two electrical contacts in addition to the base shell.

3.63 double-ended lamp: A linear lamp with conducting contacts at each end.

3.64 dud: A layperson's term for a nonfunctioning lamp.

3.65 early failure: A lamp whose life is five minutes or less when operated within rated conditions.

3.66 ellipsoidal reflector: A reflector with the cross sectional curve of an ellipse.

3.67 envelope: The bulb or enclosure of a lamp.

3.68 effective aperture: An attribute of a lens or lens system that determines its light gathering ability. It is the average diameter of the largest bundle of light rays from an infinitely distant axial point source that can pass through the lens.

3.69 external reflector: A reflector located outside of the lamp, and ordinarily not an integral part of the lamp.

3.70 extra-low voltage lighting: Lighting by means of incandescent lamps at a voltage not exceeding a fixed limit, generally 30V rms or 42.4V peak.

3.71 eyelet: Piece of metal, insulated from the shell of the base, which is connected to one of the lead-in wires and provides an electrical contact with the lampholder.

3.72 faceted reflector: A reflector made up of small facets rather than a smooth continuously curved surface. The facets may have various geometrical shapes.

3.73 family: See *lamp family.*

3.74 ferrule: A short metal tube or thimble-like bushing used to hold and/or make electrical contact to a lamp.

3.75 filament: Threadlike conductor, usually of tungsten, which is heated to incandescence by the passage of an electric current. It may be coiled "C" or coiled-coil "CC".

3.76 filament WHT: Refers to the maximum "width", "height", and "thickness" of the theoretical box locating the limits of the filament centered on the light center and lamp axis intersection.

3.78 film gate: That portion of a projector that positions slides or frames on motion picture film during projection.

3.79 film plane: The nominal location of the film or slide emulsion when positioned in the film gate.

3.80 finish: Bulb surface condition such as frosted, clear, blacktop, etched, texture, etc.

3.81 flicker: A condition of rapidly fluctuating light intensity.

3.82 flux: See *luminous flux.*

3.83 *f*-number: A numerical value that indicates the light gathering ability of a lens. The value is frequently obtained by dividing the lens' focal length by its effective aperture and expressed with the *"f"* prefix.

3.84 *f*-stop: A colloquialism for *f-number.*

3.85 focal length: Distance between the principal points of a lens or the vertex of a reflector and the focal point.

3.86 footcandle (fc): A unit of illuminance equal to one lumen per square foot.

3.87 forced cooling: Cooling by means of a fan rather than by convection.

3.88 frosted bulb: Bulb which is made diffuse by roughening its inner or outer surface.

3.89 fuse (internal-external): An electrical safety device consisting of or including a wire or strip of fusible metal that melts and interrupts the circuit when the current exceeds a particular level.

3.90 gate: See *film gate.*

3.91 grille: See *guard.*

3.92 guard: Part of a lighting fixture in the form of a grille which renders the lamp inaccessible or protects it against mechanical

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damage. Alternatively it retains fragments of the lamp or of the protective glass in case of breakage.

3.93 halide lamp: See *metal-halide lamp.*

3.94 halogen lamp: See *tungsten-halogen lamp.*

3.95 hard glass bulb: Lamp bulb made of glass with a high softening temperature, and which is resistant to thermal shock.

3.96 heat filter: A filter which transmits visible light and absorbs or reflects, or both, infrared.

3.97 heat sink: A device placed in contact with or around a lamp's seal or pinch to reduce their temperatures.

3.98 hectolux: 100 lux.

3.99 high intensity discharge (HID) lamp: An electrical discharge lamp in which the light producing arc is stabilized by wall temperature, and the arc tube has a bulb wall loading in excess of three watts per square centimeter. HID lamps include groups of lamps known as mercury, metal halide, and high pressure sodium.

NOTE – Specific definitions applying to HID lamps can be found in ANSI C82.9.

3.100 high pressure lamp: A lamp in which the CAE equals or exceeds 5 joules cold (50°C or less). See ANSI/UL 122.

3.101 hot mirror: An interference filter that transmits visible radiation but reflects infrared radiation.

3.102 IEC: Abbreviation for International Electrotechnical Commission.

3.103 illuminance: The density of luminous flux incident on a surface. The SI unit is the lumen per square meter, or lux. A lux meter or footcandle meter is the instrument commonly used to measure illuminance.

3.104 illumination: The act of illuminating or state of being illuminated.

3.105 incandescence: The self-emission of radiant energy in the visible spectrum due to the thermal excitation of atoms or molecules.

3.106 incandescence time: The time that it takes the brightness of a lamp filament to increase to 90% of its normal operating brightness after the power is turned on.

NOTE – See *nigrescence time,* also.

3.107 incandescent filament lamp: A lamp in which light is produced by a filament heated to incandescence by an electrical current.

3.108 indexing ring: A ring of a prefocus lamp to aid in proper seating of the base, so as to ensure correct alignment of the light beam.

3.109 infrared radiation: For practical purposes any radiant energy within the wave length range of 770 to 10^6 nanometers.

3.110 initial lumens: Lumens produced when a lamp is new.

3.111 internal reflector: A focussing reflector (usually parabolic or elliptic) within a lamp.

3.112 integral reflector: A lamp reflector that is cemented or permanently attached to the bulb.

3.113 invalid defective: See *normal life failure.*

3.114 K: Abbreviation for Kelvin units (Celsius degrees above absolute zero).

3.115 lamp: A generic term for a man-made source of light. Refers to the complete unit including filament of electrodes, bulb, base, and other components.

3.116 lamp family: A group of lamps with similar physical but not electrical or light characteristics.

3.117 lampholder: Device into which the base of a lamp is inserted for holding it in position and usually connecting it with the electric supply.

NOTE – The term *socket* is often used interchangeably with lampholder.

3.118 LCL: Abbreviation for light center length.

3.119 lead: A part providing connection to a lamp filament.

3.120 lead foil: A thin ribbon of metal to provide electrical connection to a filament through the seal or pinch.

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3.121 lead weld: The connection between two parts of the electrical circuit in or near the seal or pinch area of a lamp.

3.122 leaker: A lamp with a crack or separation in the envelope material which has allowed air to enter the lamp. Milky, cloudy, or black deposits identify this condition.

3.123 life-rating: See *rated life.*

3.124 life test of lamps: A test in which lamps are operated under specified conditions for the purpose of obtaining information on lamp life. See ANSI C78.1450.

3.125 light center length (LCL): The distance from the light source to a specified reference point on the lamp.

3.126 low voltage lamp: A lamp designed for operation at less than line voltage (120 V), by means of a transformer or solid state device.

3.127 lumen (lm): SI unit of luminous flux. It is the luminous flux emitted within a unit solid angle (one steradian) by a point source having a uniform luminous intensity of one candela.

3.128 luminous efficacy: Lumens per watt (lm/W) provided by a lamp.

3.129 luminous intensity (candlepower): Luminous flux per unit solid angle. The SI unit is the lumen per steradian, also called the candela. Candle power is a popular term for luminous intensity.

3.130 luminance: Luminous intensity per unit area. Area density of angular flux density. The SI unit is the candela per square meter, also called the nit. The subjective effect of luminance is called brightness.

3.131 luminous flux: Luminous power. The S.I. unit is the lumen.

3.132 lux (lx): A unit of illuminance equal to one lumen per square meter.

NOTE – The lumen per square meter is the SI unit of illuminance.

3.133 material: Refers to bulb material composition such as; vitreous silica, soft glass or hard glass.

3.134 maximum base temperature: The maximum temperature that the components in the base area of a lamp can endure over the expected life of the lamp.

3.135 maximum overall length (MOL): The maximum dimension of a lamp from base to base for double ended lamps or base to extreme point of bulb for single ended lamps.

3.136 medium pressure lamp: A lamp in which the CAE is greater than 0.5 joules and less than 5 joules. See ANSI/UL 122.

3.137 medium base: Lamp base about one inch in diameter, for example, medium screw base, medium prefocus base.

3.138 mercury lamp: See *high intensity discharge (HID) lamp.*

3.139 mercury vapor: An arc or discharge lamp making use of mercury vapor.

3.140 metal-halide lamp: Discharge lamp in which the light is produced by the radiation from a mixture of a metallic vapor (for example, mercury) and the products of the dissociation of halides (for example, halides of thallium, indium or sodium).

3.141 methylated spirit: Synonym for alcohol used to clean lamp bulbs.

3.142 mogul base: A lamp base about 1-1/2 inches in diameter, for example mogul screw base, mogul prefocus base.

3.143 MOL: Abbreviation for maximum overall length.

3.144 multilayer dielectric filter: A filter consisting of alternating optically thin layers of two or more transparent non-conductive materials and thereby employing the properties of optical reflectance and interference to selectively transmit and reflect different proportions of various wavelengths of electromagnetic radiation in the ultraviolet, visible and infrared spectral regions. See also *Cold Mirror, Dichroic Filter, Hot Mirror.*

3.145 nanometer (nm): Preferred SI unit of visible light wavelength measurement equal to 10^{-9} meter.

3.146 nigresence time: The time that it takes the brightness of an incandescent lamp to decrease to 10% of its normal operating brightness after the power is turned off.

NOTE – See *incandescence time,* also.

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3.147 nit (nt): A unit of luminance equal to one candela per square meter.

NOTE – Candela per square meter is the International Standard (SI) unit of luminance.

3.148 nominal (life, luminous flux, etc.): Approximate value or expected value.

3.149 normal life failure: A lamp that failed within the statistical tolerances (relative to rated life) as defined in ANSI C78.1450.

3.150 normal burnout: See *normal life failure.*

3.151 open rack: A method for life testing of lamps in an open space without enclosures or special cooling devices.

3.152 operating position: Describes the intended operating position of the lamp, or of its beam, for optimum service.

3.153 optical axis: An imaginary line which ideally passes through the vertices, centers of curvature, and focal points of the elements in an optical system.

3.154 pin or post: Piece of metal, usually of cylindrical shape, fixed at the end of the base so as to engage in the corresponding hole in a lampholder for positioning the base or for making electrical contact, or both.

3.155 pinch: Part of a lamp composed of a mass of glass material into which the lead wire(s) or foils(s) are sealed.

3.156 pinch temperature: See *seal temperature.*

3.157 prefocus lamp: Lamp in which the luminous element is accurately adjusted in position with regard to locating devices forming part of the base. Such a base is particularly identified by the letter "P" in the base code.

3.158 press lead: Metal wire or ribbon which forms part of a lead-in wire, sealed in the pinch and having an expansion coefficient compatible with that of the glass used for the pinch seal of the bulb.

3.159 projector: Lighting equipment which, by means of mirrors or lenses, concentrates the light in a limited solid angle so as to obtain a high value of luminous intensity.

An optical device for creating real images from film slides, opaque copy, or video.

3.160 projection lamp: Lamp in which the luminous element is so mounted that the lamp may be used with an optical system projecting the light in chosen directions. More specifically this refers to a lamp intended for use in equipment for the projection of either still or motion pictures on a screen.

3.161 protective shield: An external baffle or labyrinth or solid lens to prevent the escape of bulb fragments in case of shattering.

3.162 proximity reflector: A small non-focussing reflector within a lamp and mounted immediately behind a planar filament. Also, see *internal reflector.*

3.163 quartz: See *vitreous silica.*

3.164 quartz-iodine: An obsolete term for tungsten-halogen lamp.

3.165 rated life: Rated life is a value assigned by the lamp manufacturer.

NOTE – A manufacturer may base the rating on the average results of a series of lamp tests.

3.166 reference (axis, plane, surface, etc.): The axis, plane, or surface to which various measurements are made.

3.167 reference lamp: A seasoned lamp with stable operating parameters close to nominal values.

3.168 reference surface: Surface from which parameters are measured or specified.

3.169 reflector: Device, depending essentially on the phenomenon of reflection, used to alter the spatial distribution of the luminous flux from a source.

3.170 reflector lamp: Incandescent or discharge lamp in which part of the bulb, generally of suitable shape, is coated with a reflecting material so as to control the light.

3.171 regenerative cycle: See *halogen cycle.*

3.172 reimaging reflector: A lamp reflector that positions an image of the filament into or adjacent to the actual filament to increase overall illumination of the system.

3.173 relative aperture: The effective aperture of a lens expressed as a fraction of the lens' focal length. *f-number* is the reciprocal representation of the relative aperture.

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3.174 renewal lamp: A replacement rather than original equipment lamp.

3.175 rim reference: The condition where a lamp's reference plane is established in the rim of the lamp's reflector for mounting, centering and aiming purposes. This is in contrast to the usual condition where the reference plane is in the base of the lamp.

3.176 RSC: Abbreviation for recessed single contact lamp base.

3.177 safety shield: See *protective shield.*

3.178 SC: Abbreviation for single contact lamp base.

3.179 SCR: Abbreviation for silicon controlled rectifier. It is a part of the circuitry for a type of lamp dimmer system.

3.180 screen lumens: The quantity of luminous flux reaching the screen from the projector.

3.181 screen illuminance: The amount of light on a screen measured in lux or footcandles by a standard procedure.

3.182 screen uniformity: See *CC.*

3.183 seal: The place within a lamp where the power leads are hermetically sealed to the envelope or bulb. In certain types of lamps, as in tungsten-halogen lamps, the seal area is called a *pinch.*

3.184 seal failure: A lamp failure at the seal.

3.185 seal temperature: Expressed in degrees Celsius minimum or maximum, or both, applied to the area where the power leads are sealed into the bulb material.

3.186 service: The initial purpose for which the lamp is designed such as projection (8mm, 16mm, etc.), studio or miscellaneous.

3.187 service life: Lamp life (normally expressed in hours) in service as affected by voltage variations, vibrations, shock, excessive heat conditions, etc.

3.188 shattering hazard: The potential hazard from the contained atmospheric energy of a lamp. Ordinarily applied only to high pressure arc lamps.

3.189 shield: See *protective shield.*

3.190 short-arc lamp: Discharge lamp in which the distance between the electrodes is small (of the order of 1 to 10 mm).

3.191 single-coil filament: Filament wound in the form of a helix or similar shape.

3.192 single-ended lamp: A lamp with both electrical connections at one end, in contrast to a "double-ended" lamp.

3.193 socket: See *lampholder.*

3.194 socket voltage: The voltage at the point where electrical connection is made to the lamp.

3.195 soft glass bulb: Lamp bulb made of glass with a relatively low softening temperature and resistance to thermal shock. See *hard glass bulb.*

3.196 soft start: The process of applying less than full rated power to an incandescent lamp during a brief start-up period.

3.197 solid state device: Lamp control device utilizing components such as diodes and SCR's.

3.198 sphere lumens: The total luminous flux given off in all directions by a lamp.

3.199 spill or spillover: See *spill light.*

3.200 spill light (of a floodlight): is the scattered light falling outside the beam, which is not optically controlled.

Stray light outside of the main beam of a luminaire; light that is misplaced or undesired within a scene.

3.201 starting device: Electrical apparatus that provides the conditions required for starting a discharge.

3.202 starting aid: A device on, or adjacent to, a lamp to aid starting.

3.203 supply voltage: The nominal voltage at the power point or outlet. See *socket voltage.* Also called *line voltage* or *mains voltage.*

3.204 switching mode power supply: A solid state dc output power supply utilizing control of voltage duty cycle to regulate and rectify the ac input voltage.

3.205 T: Abbreviation for tubular shaped lamp envelope.

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3.206 TFS: Abbreviation for transformer free system.

3.207 thermocouple: A bimetallic junction device for sensing temperature used in conjunction with suitable instrumentation.

3.208 top: Bulb top indicates whether an opaque stray light shield is present.

3.209 tungsten-halogen lamp: A tungsten incandescent lamp whose gas fill contains a certain proportion of halogens.

3.210 2PP: Abbreviation for two-pin prefocus.

3.211 UL: Abbreviation for Underwriters Laboratories. An independent testing laboratory that will test equipment to see if it meets certain safety standards when properly used.

3.212 ultraviolet radiation: For practical purposes any radiant energy within the wavelength range 10 to 380 nm.

3.213 UV: Abbreviation for ultraviolet.

3.214 valid defective: A lamp that failed because of manufacturing flaws.

3.215 vented base: A lamp base containing holes or openings which may be used to aid cooling.

3.216 ventilation: The ventilation requirement for a lamp may be designated as convection or forced.

3.217 vitreous silica: A chemically stable and refractory glass made from silica alone. Sometimes called quartz glass, vicor, or vycor.

3.218 wattage: The rated input wattage (volts × amps) of the lamp.

3.219 working distance (WD): The distance from the reference plane of a lamp to the film plane, in a projection system.

- WD applies only to lamps employing internal or integral reflectors.
- WD is a primary identifier of the lamp design, as related to a particular projection system.
- The value of WD is dependent upon the optical characteristics of the lamp's reflector and the auxiliary optical components.
- Although the use of a lamp type with another lens system would suggest another WD value, only one value is to be assigned to a lamp type. That value is the WD of the original application.

3.220 xenon lamp: An arc discharge lamp making use of xenon gas.

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