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Standard Terminology Relating to Protective Clothing¹

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1. Scope

- 1.1 This standard defines the specialized terms used in standards developed by Committee F23 on Protective Clothing.
- 1.2 Definitions of Terms, which were drafted for use only in a single standard, are also included for convenient reference. Under ASTM rules they may become full definitions in the future, if they are used in additional standards.
- 1.3 Additional terminology relevant to protective clothing and to the components of protective clothing can be found in Terminology [D123](#), [D1566](#), and [D4805](#).

2. Referenced Documents

2.1 *ASTM Standards:*²

- [D123 Terminology Relating to Textiles](#)
- [D1566 Terminology Relating to Rubber](#)
- [D4805 Terminology for Plastics Standards \(Withdrawn 2002\)](#)³
- [F739 Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Continuous Contact](#)
- [F955 Test Method for Evaluating Heat Transfer through Materials for Protective Clothing Upon Contact with Molten Substances](#)
- [F1001 Guide for Selection of Chemicals to Evaluate Protective Clothing Materials](#)
- [F1002 Performance Specification for Protective Clothing and the Materials from Which It Is Made for Use by Workers Exposed to Specific Molten Substances and Related Thermal Hazards](#)
- [F1060 Test Method for Thermal Protective Performance of Materials for Protective Clothing for Hot Surface Contact](#)
- [F1154 Practices for Qualitatively Evaluating the Comfort, Fit, Function, and Durability of Protective Ensembles and Ensemble Components](#)
- [F1291 Test Method for Measuring the Thermal Insulation of Clothing Using a Heated Manikin](#)
- [F1358 Test Method for Effects of Flame Impingement on Materials Used in Protective Clothing Not Designated Primarily for Flame Resistance](#)
- [F1359 Test Method for Liquid Penetration Resistance of Protective Clothing or Protective Ensembles Under a Shower Spray While on a Mannequin](#)
- [F1383 Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Intermittent Contact](#)
- [F1407 Test Method for Resistance of Chemical Protective Clothing Materials to Liquid Permeation—Permeation Cup Method](#)
- [F1414 Test Method for Measurement of Cut Resistance to Chain Saw in Lower Body \(Legs\) Protective Clothing](#)
- [F1449 Guide for Industrial Laundering of Flame, Thermal, and Arc Resistant Clothing](#)
- [F1458 Test Method for Measurement of Cut Resistance to Chain Saw of Foot Protective Devices](#)
- [F1461 Practice for Chemical Protective Clothing Program](#)
- [F1670 Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Synthetic Blood](#)
- [F1671 Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi-X174 Bacteriophage Penetration as a Test System](#)

¹ This terminology is under the jurisdiction of ASTM Committee [F23](#) on Personal Protective Clothing and Equipment and is the direct responsibility of Subcommittee [F23.91](#) on Editorial.

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² For referenced ASTM standards, visit the ASTM website, [www.astm.org](#), or contact ASTM Customer Service at [service@astm.org](#). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on [www.astm.org](#).

F1731 Practice for Body Measurements and Sizing of Fire and Rescue Services Uniforms and Other Thermal Hazard Protective Clothing

F1818 Specification for Foot Protection for Chain Saw Users

3. Terminology

3.1 Definitions:

- after-flame time**, *n*—the length of time for which a material continues to flame after the ignition source has been removed. (F23.20) **F1358**
- afterglow**, *n*—a glow in a material after the removal of an external ignition source or after the cessation (natural or induced) of flaming of the material (see also **glow**). (F23.20) **F1358**
- agar**, *n*—a semisolid culture medium used to support the growth of bacteria and other micro-organisms. (F23.40) **F1671**
- analytical detection limit**, *n*—a number, expressed in units of concentration (or amount), that describes the lowest concentration level (or amount) that an analyst can determine to be different from an analytical blank (background level). (F23.70) **F1461**
- airborne exposure pathways**, *n*—inhalation routes of exposure to the medical face mask wearer.
- analytical technique**, *n*—a procedure whereby the concentration of the test chemical in a collection medium is quantitatively determined. (F23.30) **F739**
- anisotropic**, *adj*—having different values for a specific property in different directions. (F23.20) **F1358**
- armhole**, *n*—*in garment construction*, the area of a garment through which the arm passes or into which a sleeve is fitted. (See **armscye**.) (F23.60) **F1731**
- armscye**, *n*—*in garment construction*, the opening in a garment for the attachment of a fitted sleeve. (See **armhole**.) (F23.60) **F1731**
- aseptic**, *adj*—sterile, free from viable microbiological contamination. (F23.40) **F1671**
- assay**, *n*—analysis of a mixture to determine the presence or concentration of a particular component. (F23.40) **F1671**
- assay fluid**, *n*—a sterile liquid used to wash the test specimen surface to determine microbiological penetration. (F23.40) **F1671**
- authority having jurisdiction**, *n*—the organization, office, or individual responsible for approving any equipment, installation, or procedure. (F23.20) **F1818**
- back waist length**, *n*—*in body measurements*, the vertical distance along the spine from the cervical to the waist. (F23.60) **F1731**
- bacterial filtration efficiency (BFE)**, *n*—the effectiveness of medical face mask material in preventing the passage of aerosolized bacteria; expressed in the percentage of a known quantity that does not pass the medical face mask material at a given aerosol flow rate.
- bacteriophage**, *n*—a type of virus which infects bacteria. (F23.40) **F1671**
- bartack**, *n*—*in garment construction*, a reinforcement at points of strain. (F23.60) **F1731**
- biological monitoring**, *n*—the chemical analysis of chemicals or metabolites, or both, from a worker's blood, urine, fingernails, sweat, breath, and so forth. (F23.70) **F1461**
- body dimension**, *n*—*in garment construction*, a body measurement which can be used to build a sizing system or to select an appropriately sized garment. (F23.60) **F1731**
- body fluid**, *n*—any liquid produced, secreted, or excreted by the human body.
- body fluid simulant**, *n*—a liquid which is used to act as a model for human body liquids. (F23.40) **F1670, F1671**
- body measurement**, *n*—*in anthropometry*, a standardized distance between two specified points on the human anatomy. (F23.60) **F1731**
- break-open**—in testing thermal protective material, a response evidenced by the formation of a hole in the material, which allows the molten substance to pass through the material. (F23.80) **F955**
- breakthrough detection time**, *n*—the elapsed time measured from the start of the test to the sampling time that immediately precedes the sampling time at which the test chemical is first detected. (F23.30) **F739, F1383**
- buddy system**, *n*—a means of organizing employee work groups whereby each participant is matched with another so that prompt assistance can be rendered in the case of any emergency. (F23.70) **F1461**

- burn distance**, *n*—the measurement from the bottom edge of the specimen to the farthest point that shows evidence of damage due to combustion. (F23.20) **F1358**
- burning behavior**, *n*—all the changes that take place when materials or products are exposed to a specified ignition source. (F23.20) **F1358**
- bust girth**, *n*—*in body measurement*, the circumference of the body over the fullest part of the breasts and parallel to the floor. (See **chest girth**.) (F23.60) **F1731**
- care and maintenance**, *n*—effective cleaning to remove soil and maximize use life of garments while maintaining (not removing) protective properties. (F23.80) **F1449**
- centerline**, *n*—*in foot protective devices*, a line which extends from the toe of the footwear horizontally along the sole to the heel vertically to the top of the footwear, and diagonally to the point of intersection at the toe. (F23.20) **F1458**
- certification**, *n*—a system whereby an organization determines that a manufacturer has demonstrated the ability to make a product that complies with the requirements of the specification, authorizes the manufacturer to use a label on products that comply with the requirements of the specification, and conducts a follow-up program to verify the methods the manufacturer uses to determine compliance with the requirements of this specification. (F23.20) **F1818**
- certification organization**, *n*—an independent, third party organization that determines product compliance with the requirements of the specification with a labeling and listing follow-up program. (F23.20) **F1818**
- cervical**, *n*—*in body measurements*, the most prominent bone at the base of the neck. (F23.60) **F1731**
- chain saw**, *n*—a portable power operated tool used for cutting wood which has cutters linked in a chain. (F23.20) **F1414, F1458**
- chain speed**, *n*—the velocity of synchronized movement of linked cutters around a bar and sprocket. (F23.20) **F1414, F1458**
- chainstop**, *n*—*for chainsaw cut resistance*, the resulting action when a material clogs (jams) the drive sprocket or slows the speed sufficiently to prevent advancement of the chain saw. (F23.20) **F1414, F1458, F1818**
- challenge chemical**—a chemical used to contact a protective clothing material sample to determine chemical/protective clothing material interactions or compatibility. (F23.30) **F1001**
- challenge suspension**, *n*—a liquid containing an agent that is used to test the penetration resistance of materials. (F23.40) **F1671**
- charring**—the formation of a carbonaceous residue as the result of pyrolysis or incomplete combustion. (F23.80) **F1060**
- chemical protective clothing (CPC)**, *n*—any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous chemical. (F23.70) **F1461**
- chemical-protective suit ensemble**—the combination of a chemical-protective suit (totally encapsulating, splash-protective) with the wearer's protective clothing with respiratory protective equipment, hoods, helmets, gloves, boots, communications system, and cooling device, or some combination of those systems, cooling devices, and other accessories intended to protect the wearer from a chemical hazard when worn together. (F23.50) **F1154, F1359**
- chest**, *n*—*in garment construction*, a measurement taken from below each armhole seam straight across the garment while it is laid flat. (F23.60) **F1731**
- chest girth**, *n*—*in body measurements*, the circumference of the body over the shoulder blades, under the arms and across the upper chest. (See **bust girth**.) (F23.60) **F1731**
- clo**, *n*—a unit of thermal resistance (insulation) equal to 0.155 K-m₂/W. (F23.60) **F1291**

DISCUSSION—

The value of the clo was selected as roughly the insulation value of typical indoor clothing, which should keep a resting man (producing heat at the rate of 58 W/m₂) comfortable in an environment at 21°C, air movement 0.1 m/s.

- closed-loop**, *adj*—refers to a testing mode in which the collection medium volume is fixed. (F23.30) **F739, F1383**
- clothing ensemble**, *n*—a group of garments worn together on the body at the same time. (F23.60) **F1291**
- collection medium**, *n*—a liquid or gas that does not affect the measured permeation and in which the test chemical is freely soluble or adsorbed to a saturation concentration greater than 0.5 weight or volume percent. (F23.30) **F1383**
- combustion**, *n*—a chemical process of oxidation that occurs at a rate fast enough to produce heat and usually light either as glow or flames. (F23.20) **F1358**

- contact time, n**—*in an intermittent contact test*, the duration during each cycle that the challenge side chamber of the permeation cell is filled with the test chemical. (F23.30) **F1383**
- core temperature, n**—the mean temperature of the thermal core.
- crotch, n**—*in anatomy*, the body area adjacent to the vertex of the included angle between the legs. (F23.60) **F1731**
- cuff, n**—*in garment construction*, a finished edge at the end of either a garment sleeve or trouser leg created by turning back or rolling up and stitching the fabric. (F23.60) **F1731**
- cumulative permeation, n**—the total mass of chemical that permeates during a specified time from when the material is first contacted. (F23.30) **F1383, F1407**
- cut resistance, n**—*in chainsaw testing*, the ability of a material, while in contact with the linked cutters, to resist cut through of the cutters of a moving saw chain, independent of either jamming or chain stop. (F23.20) **F1414, F1458, F1818.**
- cut resistance (blade), n**—*in blade cut testing*, the property that hinders cut through when a material or a combination of materials is exposed to a sharp-edged device.
- cut-through time, n**—*for chainsaw cut resistance*, the time required for a running chainsaw to effect complete breakthrough of a protective garment or protective device. (F23.20) **F1414, F1458, F1818**
- cycle time, n**—*in an intermittent contact test*, the interval of time from the start of one contact period to the start of the next contact period. (F23.30) **F1383**
- decontamination, n**—the removal of a contaminant or contaminants from the surface or matrix, or both, of CPC to the extent necessary for its next intended action (for example, reuse and disposal). (F23.70) **F1461**
- dripping**—in testing thermal protective material, a response evidenced by flowing of the fiber polymer. (F23.80) **F955**
- ease, n**—*in garment construction*, the difference between garment measurement and body measurement. (F23.60) **F1731**
- elastomer, n**—a term often used for rubber and polymers that have properties similar to rubber. (F23.70) **F1461**
- elbow, n**—*in anatomy*, the joint that articulates between the upper arm and the lower arm. (F23.60) **F1731**
- embrittlement**—the formation of a brittle residue as a result of pyrolysis or incomplete combustion. (F23.80) **F955, F1060, F1358**
- end user, n**—*for the purpose of this guide*, this term is used to identify specifically the party requiring protective clothing (for example, the employer of the person wearing the garment). (F23.80) **F1449**
- Fick's laws of diffusion, n**—mathematical descriptions of the movement of one type of molecule through another. (F23.70) **F1461**
- finish, n**—a chemical or mechanical modification, or both, of the fabric for a specific performance result. (F23.80) **F1449**
- finishing technique, n**—*as applies to laundry and dry cleaning procedures*, the mechanical means by which the garment is put in its final state (for example, pressing, drying, wrinkle removal, and so forth). (F23.80) **F1449**
- fit, n**—the quality, state or manner in which the length and closeness of clothing, when worn, relates to the human body. (F23.60) **F1731**
- flame, n**—*as related to ignition of textiles*, a controlled hot luminous zone of gas or matter in gaseous suspension, or both, of constant size and shape that is undergoing combustion as evidenced by a low-intensity heat source of less than 5 kW, such as a burner flame on a gas stove. (F23.20) **F1358**
- flame impingement, n**—direct contact between a flame and a material. (F23.20) **F1358**
- flame resistance, n**—the property of a material whereby flaming combustion is prevented, terminated, or inhibited following application of a flaming or nonflaming source of ignition, with or without subsequent removal of the ignition source.
- flammability, n**—those characteristics of a material that pertain to its ignition and support of combustion. (F23.20) **F1358**
- follow-up program, n**—the sampling, inspection, tests, or other measures conducted by the certification organization on a periodic basis to determine the continued compliance of products that are being made by the manufacturer to the requirements of the standard specification. (F23.20)
- foot, n**—the terminal part of the vertebrate leg, including the ankle, upon which an individual stands (see **foot protective device**). (F23.20) **F1458**

- foot protective device**, *n*—~~for chain saw cut resistance~~, an article of personal equipment which ~~is worn over~~ covers the foot and ankle for the purpose of providing limited protection from injury due to contact with a moving saw chain. (F23.20) **F1458**
- footwear**, *n*—a boot or shoe of any construction. (F23.20) **F1458**
- gaiter**, *n*—~~for chain saw cut resistance~~, a foot protective device ~~worn outside~~ permanently attached to the outside of the footwear. (F23.20) **F1458**
- garment**, *n*—a single item of clothing (for example, shirt). (F23.60) **F1291**
- girth**, *n*—in body measurements, a circumferential measurement around some part of the body, such as neck, chest, waist, and so forth. (F23.60) **F1731**
- glow**, *n*—visible, flameless combustion of the solid phase of a material. (F23.20) **F1358**
- hazard assessment**, *n*—the determination of the lack of safety or degree of risk based on all integral parts of an exposure situation, including the characteristics of the chemical(s) to which one is exposed and the conditions that determine degree of exposure. (F23.70) **F1461**
- hazardous chemical**—any solid, liquid, gas, or mixture thereof that can potentially cause harm to the human body through inhalation, ingestion, or skin absorption. (F23.60) **F1154, (F2350), F1359**
- heat flux**, *n*—the thermal intensity indicated by the amount of energy transmitted per unit area and per unit time ($\text{cal}/\text{cm}^2\text{-s}$) (watts/cm^2). (F23.80) **F1060, F955**
- hem**, *n*—*in garment construction*, a simple finish in which the raw fabric edge is turned under and stitched to a garment. (See **cuff**.) (F23.60) **F1731**
- hip**, *n*—*in anatomy*, the laterally projecting region formed by the lateral parts of the pelvis and the upper part of the femur together with the flesh covering them. (F23.60) **F1731**
- hip girth**, *n*—*in body measurements*, the maximum circumference of the body at the level of maximum prominence of the buttocks. (F23.60) **F1731**
- ignition**, *n*—the initiation of combustion. (F23.80)
- industrial hygienist**, *n*—a person who, by experience and academic training, is qualified to recognize, evaluate, and control chemical, physical, and biological agents in the workplace, or a person certified by the American Board of Industrial Hygiene. (F23.70) **F1461**
- inseam**, *n*—*in garment construction*, with the trousers folded by mating the inside leg seams, measure from center of crotch to bottom edge of trouser's leg or cuff. (F23.60) **F1731**
- inseam length**, *n*—*in body measurements*, from center of crotch to 25.4 mm (1 in.) below top of the shoe. (F23.60) **F1731**
- jamming**, *n*—*for chainsaw cut resistance*, the clogging action manifested by a protective garment which can produce a chain stop. (F23.20) **F1414, F1458, F1818**
- knee**, *n*—*in anatomy*, the joint between the lower and upper leg. (F23.60) **F1731**
- label**, *v*—*for protective clothing*, to attach a symbol or other identifying mark, the use of which has been authorized by a certification organization. (F 23.20) **F1818**
- laundry formula**, *n*—a list of chemicals, amounts, and procedures used in a laundry operation. (F23.80) **F1449**
- lawn**, *n*—*as in microbiology*, a cloudy, uniform growth of bacteria in a thin layer of top agar in a petri dish. (F23.40) **F1671**
- liner**, *n*—a foot protective device worn inside the footwear. (F23.20) **F1458**
- liquid-tight**—~~for the purpose of this practice~~, referring to the absence of detectable liquid penetration inside the chemical protective suit when sprayed with the liquid at specified pressure, direction and duration. (F23.50) **F1359**
- list**, *v*—*for protective clothing*, to publish a register of equipment or materials which has been verified by a certification organization as being acceptable and meeting the requirements of standard specifications. (F23.20) **F1818**
- lower body**, *n*—that part of the human body which includes all portions between the waist and feet, not to include the feet. (F23.20) **F1414**
- lysis**, *n*—the disintegration or destruction of whole bacterial cells. (F23.40) **F1671**

- maternity wear**, *n*—clothing worn during pregnancy. (F23.60) **F1731**
- medium (plural, media)**, *n*—a nutrient system for the cultivation of cells or organisms, and especially bacteria. (F23.40) **F1671**
- metabolic rate**, *n*—the rate of transformation of chemical energy into heat and mechanical work by aerobic and anaerobic activities within an organism.
- minimum detectable mass permeated**, *n*—the smallest mass of permeant that is detectable with the complete permeation test system. (F23.30) **F739, F1383**
- minimum detectable permeation rate**, *n*—the lowest rate of permeation that is measurable with the complete permeation test system. (F23.30) **F739, F1383**
- molten substances**—metals in their liquefied, elevated temperature state, as well as related non-metallic substances also handled at elevated temperatures such as slag, dross, and salt. Excluded are liquid hot substances that may be associated with metal processing such as water, oil, and caustic solutions. (F23.80) **F1002**
- morphology**, *n*—the form and structure of a particular organism. (F23.40) **F1671**
- neck base girth**, *n*—*in body measurements*, the circumference of the neck over the cervical at the back and at the top of the collar bone at the front. (F23.60) **F1731**
- neck girth**, *n*—*in garment construction*, with shirt open in front and collar fully extended and laid out flat, measure from center of collar button to the far end of the button hole. (F23.60) **F1731**
- nutrient broth**, *n*—a liquid medium. (F23.40) **F1671**
- occlusion**, *n*—the physical process of covering a chemical that has been applied to or spilled on the skin, thereby disallowing its evaporation and generally increasing its absorption through the skin. (F23.70) **F1461**
- open loop**, *adj*—refers to a testing mode in which fresh collection medium flows continuously through the collection chamber of the test cell. (F23.30) **F739, F1383**
- overall gas penetration resistance**, *n*—the integrity of a totally encapsulating chemical protective suit to resist the inward leakage of gases when exposed to a hazardous chemical environment. (F23.60) **F1154**
- overall liquid penetration resistance**, *n*—the integrity of a chemical protective suit to resist the inward leakage of liquids when exposed to a hazardous chemical environment. (F23.60) **F1154**
- physical-chemical parameters**, *n*—values for physical or chemical properties of a permeant or polymer, or both, such as solubility parameters, molecular weight, vapor pressure, and so forth. (F23.70) **F1461**
- placket**, *n*—*in garment construction*, a finished garment opening that is usually dependent on mechanical devices called closures to secure the opening. (F23.60) **F1731**
- plastic**, *n*—a material that contains, as an essential ingredient, one or more organic polymeric substances of large molecular weight, is solid in its finished state, and, at some stage in its manufacture of processing into finished articles, can be shaped by flow. (F23.70) **F1461**
- plaque**, *n*—*as in virology*, a visible, clear area, which is theoretically the result of the infection and lysis of host cells by a single viable virus. (F23.40) **F1671**
- plaque forming unit (PFU)**, *n*—a virus particle capable of producing plaques by infecting and lysing bacteria in a lawn in top agar. (F23.40) **F1671**
- plate**, *n*—*as in microbiology*, a Petri dish containing culture medium. (F23.40) **F1671**
- polymer**, *n*—a substance consisting of molecules characterized by repetition (neglecting ends, branches, junctions, and other minor irregularities) of one or more chemically bonded types of monomeric units. (F23.70) **F1461**
- polymer sheet**, *n*—a continuous polymeric planar structure. (F23.70) **F1461**
- primary protective clothing**—protective clothing designed to be worn for work activities during which significant exposure to molten substance splash, radiant heat, and flame is likely to occur. (F23.80) **F1002**
- processing launderer (processor)**, *n*—the party performing the operation of cleaning or repairing, or both, of the flame, thermal, and arc resistant clothing.