

The Fire Protection Dictionary

This document is to aid interpretation of the terms used in the fire protection industry. In different parts of the world, different terms are used to describe the same equipment, material or property. The most important instances of such situations are included here also.

Distribution is exclusively to trainees of Tyco Fire Suppression & Building Products EMEA Training programs for:

- Water spray
- Foam and foam hardware

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Version: 3
Date: March 2010



A

ABS (American Bureau of Shipping):

Marine classification society from the USA, publishes standards for the design, construction and survey of ships and marine structures. Approves fire fighting equipment.

Active fire protection

A fire protection system in stand-by mode that requires to be activated in order to perform its function

Aeration:

The introduction of air into a foam solution stream to create bubbles that result in finished foam

AFFF (Aqueous Film Forming Foam):

A foam concentrate containing fluorocarbon surfactants that control the physical properties of water so that it is able to float and spread across the surface of a hydrocarbon liquid.

Air-aspirating:

A characteristic of a foam discharge device to draw air into the foam solution before the solution leaves the device.

Alcohol Resistant Foam concentrate:

See AR-AFFF

Annular area:

This is the space between the foam dam and the tank shell of a floating roof tank.

ANSI:

American National Standards Institute (USA), publishes the ANSI standards.

Application rate:

The rate of which a foam solution is applied to a fire. This is expressed as litres of foam solution per square metre of fire area per minute ($\text{dm}^3/\text{min}/\text{m}^2$).

Application time:

The duration of time over which foam is applied.

Approval:

Certificate that ensures a foam concentrate or equipment meets the requirements of a standard.

Approved:

Acceptable to the authority having jurisdiction (NFPA)

Aquatic toxicity:

A measure of how poisonous foam concentrate is to creatures living in the water environment

AR-AFFF:

An AFFF that contains a polysaccharide that forms a layer only on polar solvents to separate and protect the finished foam.

Around –the –pump proportioner:

A system that uses a venturi inductor installed in a bypass line between the discharge and the suction side of a water pump and suitable variable or fixed orifices to induct foam concentrate from a tank or container into the pump suction line.

Aspirated foam:

Foam solution expanded with air

ASME:

American Society of Mechanical Engineers (USA), publishes the ASME standards.

ASTM:

American Society for Testing of Materials (USA), publishes the ASTM standards.

Assessment

Is the process of analysing and evaluating hazards. It involves both causal and consequence analysis and requires determination of likelihood and risk

Authority having jurisdiction (AHJ):

An organization, office or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation or a procedure. (NFPA)

Avgas:

Aviation gasoline. Gasoline for aircraft with a high octane rating.

Avtur:

Aviation kerosene.

B

Backboard:

A vertical plate opposite the foam stream used to apply expanded foam gently onto a surface.

Back pressure:

Pressure loss created by static head and friction loss downstream a foam mixer or foam maker.

Bag tank:

See bladder tank.

Balanced pressure proportioning:

A foam concentrate proportioning system designed to inject automatically the correct quantity of foam concentrate into a water stream by balancing the pressure of a foam concentrate with that of water.

Base injection:

A technique used for the protection of fixed roof hydrocarbon fuel storage tanks where fuel-resistant aspirated foam is injected into the base of the tank and rises through the fuel to the surface of the liquid.

Balancing valve:

A device part of pump proportioner that regulates the foam concentrate flow at a pressure that is balanced to the pressure in the water line.

Barrel:

A unit of volume used in the petroleum industry that is equal to 42 US gallon or 159 liters

Biodegradable:

Capability of a substance to be broken down into innocuous products by the action of living creatures such as micro-organisms.

Bladder tank:

A foam concentrate tank fitted with an internal bladder which uses water flow through a modified venturi type proportioner to control the foam concentrate injection rate by displacing the foam concentrate within the bladder with water outside the bladder.

BLEVE:

Boiling Liquid Expanding Vapour Explosion

BOD (Biological Oxygen Demand):

The amount of oxygen consumed by aquatic micro-organisms in a specified number of days when metabolising an organic material such as foam concentrate.

Boil over:

The violent ejection of flammable liquid from its container caused by the vaporization of water beneath the body of liquid. It may occur after a lengthy burning period of products such as crude oil when the heat wave has passed down through the liquid and reaches the water bottom in the storage tank. It will occur to any significant extent with water-soluble liquids or light products such as gasoline.

BSI (British Standard Institute)

British national organisation that publishes BS standards.

Built-in inductor:

A discharge device that has the foam concentrate inductor built in.

Bund Area:

An area surrounding a storage tank which is designed to contain the liquid product in the event of a tank rupture.

Burn back resistance:

The ability of a foam blanket to resist direct flame impingement such as would be evident in a partially extinguished fire.

BV (Bureau Veritas)

Marine classification society from France, publishes standards for the design, construction and survey of ships and marine structures. Approves fire fighting equipment.

C

CEN (Comite Européen de Normalisation)

European organisation that publishes CEN/EN standards.

CAF(S):

Compressed Air Foam (System)

Chemical foam:

A type of foam produced as a result of a reaction between chemicals (now obsolete).

Class A foam:

A type of foam concentrate specially formulated for use on class A fires. Essentially composed of wetting agents that reduce the surface tension of water and allow it to soak into combustible materials easier than plain water.

Class B foam:

A type of foam concentrate specially formulated for use on fires or spills of flammable and combustible liquids.

Classification of products to IP Code Part 3:

Class 0; LPG

Class I; liquids that has a flash point below 21°C

Class II (1); liquids that has a flash point above 21°C and below 55°C, handled below flash point

Class II (2); liquids that has a flash point above 21°C and below 55°C, handled above flash point

Class III (1); liquids that has a flash point above 55°C and below 100°C, handled below flash point

Class III (2); liquids that has a flash point above 55°C and below 100°C, handled above flash point

Classification of fire to EN-2:

Class A fire, a fire in materials such as wood and paper where the cooling effect of water is of paramount importance in extinguishing the risk.

Class B fire, a fire involving a flammable liquid where a blanket or smothering effect is of first importance in extinguishing.

Class C fire, a fire involving gasses or liquefied gasses in the form of a liquid spillage, or a liquid or gas leak.

Class D fire, a fire involving reactive metals such as magnesium, sodium, lithium, potassium etc.

Classification of fire to NFPA:

Class A fire, fires which occur in ordinary combustible materials such as wood and paper, rubber and certain plastics

Class B fire, fires which occur in flammable liquids, oils, tars, lacquers etc. and flammable gasses.

Class C fire, fires involving energised electrical equipment where the electrical nonconductivity of the extinguishing agent is particularly important.

Class D fire, fires involving reactive metals such as magnesium, zirconium, lithium, potassium etc.

Cloud point:

The lowest temperature at which a synthetic foam concentrate remains clear.

COD (Chemical Oxygen Demand)

The amount of oxygen required for the complete oxidation of a known quantity of an organic material such as foam concentrate.

Code:

A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

Combustible liquid classification to NFPA:

Combustible liquid: A liquid having a flash point at or above 38°C (100°F)

Combustible liquid Class II; Any liquid that has a flash point at or above 37.8°C and below 60°C

Combustible liquid Class IIIA; Any liquid that has a flash point at or above 60°C and below 93°C

Combustible liquid Class IIIB; Any liquid that has a flash point at or above 93°C

Compatibility:

The ability of extinguishing agents to be mixed together or applied simultaneously.

Concentration:

The amount of foam concentrate contained in a given volume of foam solution. The type of foam being used determines the percentage of concentration required. For example, a 3% foam concentrate is mixed in a 3% solution (97 parts water and 3 parts concentrate), a 6% foam concentrate is mixed in a 6% solution (94 parts water and 6 parts concentrate).

Conductivity meter:

A device used to measure the conductivity value of a liquid. A changing amount of foam concentrate in water gives a changing conductivity value.

Control:

A reduction in fire intensity of 90% or more.

Control of burning:

Application of water spray to equipment or areas where a fire can occur to control the rate of burning and thereby limit the heat release from a fire until the fuel can be eliminated or extinguishment effected.

Critical application rate:

The minimum rate at which a foam solution can be applied on a given fire in order to achieve extinguishment.

Crude oil:

Hydrocarbon mixture that have a flashpoint below 65.6 °C and that have not been processed in a refinery.

Cryogenic liquid:

A liquid having a boiling point lower than -101 °C at an absolute pressure of 101 kPa

D

Deluge system

A fire protection system where the water supply valve is automatically activated. The water distribution piping is normally equipped with spray nozzles and /or open sprinklers.

Density:

See Application rate.

Deflagration:

Propagation of a combustion zone at a velocity that is less than the speed of sound in the un-reacted medium

Deluge valve:

A type of system actuation valve that is opened by the operation of a detection system installed in the same areas as the spray nozzles or by remote manual operation supplying water to all spray nozzles.

Detonation:

Propagation of a combustion zone at a velocity that is greater than the speed of sound in the un-reacted medium.

Dike area:

An area surrounding a storage tank which is designed to contain the liquid product in the event of a tank ruptures.

DIN (Deutsches Institut für Normung)

German national organisation that publishes DIN standards.

Discharge device:

A fixed, semi-fixed, mobile or portable device that directs the expanded foam flow onto a fire

Discharge time:

The minimum time required for a foam system to operate.

DNV (Det Norske Veritas)

Marine classification society from Norway; publishes standards for the design, construction and survey of ships and marine structures. Approves firefighting equipment

Downstream:

The direction in which the liquid is flowing or will flow

Drain time:

The rate at which a solution drains from a foam

Drainage drop out rate:

See drain time.

Drainage rate:

The rate at which solution drains from expanded finished foam. This is normally expressed as 25% drainage time, the time taken for 25% of the foam solution to drain from the foam.

E

EC₅₀:

The effective concentration in water of a material such as foam concentrate that would produce a particular response in 50% of a test batch of animals (immobilisation of Daphnia) or a 50% reduction in a particular response (algae growth inhibition).

Eductor:

See in-line inductor.

Eduction rate:

See induction rate.

Electrical clearance:

The air distance between the water spray equipment, including piping and nozzles, and unenclosed or un-insulated live electrical components at other than ground potential.

Escalation:

An increase in risk due to increased likelihood and / or severity of consequences

Expansion ratio:

The ratio of total foam volume formed to the volume of foam solution used to generate the foam. For example, an 8:1 expansion ratio means 800 litres of finished foam from a 100 litres of solution.

Explosive limits / range:

See LEL and UEL.

Exposure protection:

Absorption of heat through application of water spray to structures or equipment exposed to a fire, to limit surface temperature to a level that will minimize damage and prevent failure.

F

FAA:

Federal Aviation Authority, American authority responsible for civil aviation.

FFF:

Fluorine free foam. A type of foam concentrate not containing fluor surfactants.

Film forming fluor protein foam (FFFP):

A protein-based foam concentrate with film-forming characteristics.

Film (polymeric)

A chemical film, or layer, which is formed when the foam solution contacts a polar solvent such as ethanol. The layer acts as a barrier to protect the aqueous foam bubble from the “water loving” polar solvent. This type of film is not formed on when the foam solution contacts hydrocarbons (non-polar liquids) such as gasoline unless the hydrocarbon contains high levels of polar solvent additives.

Film forming:

A foam that can produce a thin film of foam solution on the surface of certain hydrocarbon fuels.

Finished foam:

The homogeneous blanket obtained by mixing water, foam concentrate and air.

Fire area:

An area that is physically separated from other areas by space, barriers, walls, or other means in order to contain fire within that area.

Fire control:

A reduction in fire intensity of approximately 90%

Fire fighting foam:

The homogeneous blanket obtained by mixing water, foam concentrate and air.

Fire incident:

An event or chain of events which has caused or could have caused injury, damage to assets, the environment or third parties

Fire point:

The lowest temperature at which a liquid will ignite and achieve sustained burning when exposed to a test flame (in accordance with ASTM-D92)

Fire risk:

The product of the chance that a specified undesired fire incident will occur and the severity of the consequences of the event

Fire-safe valves:

Metal seated valves which provide critical tight shut-off during fire and which remain operable for a minimum period of 15 minutes under fire conditions

Fixed system:

Complete installation that generates expanded foam and discharges it onto the risk to be protected.

Flame transmission:

Faint flames that flicker over the surface of a foam blanket. If the foam blanket does not cover the fuel completely, the flames may ignite exposed fuel.

Flammable liquid classification to NFPA:

Flammable liquid; A substance which is liquid at ordinary temperatures and pressures and has a flash point below 38°C (100°F).

Flammable liquid Class I; Any liquid that has a closed cup flash point below 37.8°C and a Reid vapour pressure not exceeding 2068.6 mmHg at 37.8°C.

Flammable liquid Class IA; Any liquid that has a flash point below 22.8°C and a boiling point below 37.8°C

Flammable liquid Class IB; Any liquid that has a flash point below 22.8°C and a boiling point at or above 37.8°C

Flammable liquid Class IC; Any liquid that has a flash point at or above 22.8°C but below 37.8°C

Flashback:

Re-ignition of flammable liquid caused by exposure of its vapours to a source of ignition such as a hot metal surface or a spark.

Flash point:

The lowest temperature at which a flame can propagate in the vapours above a liquid.

Fluorocarbon:

An inert organic compound in which fluorine replaces hydrogen. Used in foam concentrates to improve fuel tolerance and fluidity.

Fluor protein concentrate:

A foam concentrate based on hydrolysed protein with fluorocarbon surface active agents added.

FM or FMI:

Factory Mutual, an American insurance company, publishes standards for the design, construction and survey of building structures. Approves fire fighting equipment.

Fluidity:

A foam's ability to flow.

Foam:

A stable aggregation of small bubbles of lower density than oil or water that exhibits a tenacity for covering horizontal surfaces.

Foam agent:

See foam concentrate.

Foam chamber:

A device attached to the top outside edge of the tank shell in which foam solution is aerated and discharged into the tank.

Foam concentrate:

The foaming agent for mixing with the appropriate amounts of water and air to form the mechanical expanded foam.

Foam destroying action:

The ability of polar solvents to collapse standard foam blankets.

Foam liquid:

See foam concentrate.

Foam generator:

A device designed to introduce air into a pressurised foam solution flow.

Foam maker:

A device designed to introduce air into a pressurised foam solution flow.

Foam monitor or foam cannon:

A device, portable, fixed or truck mounted to which a foam nozzle is attached to allow the operator to direct the foam as required.

Foam pourer:

A device designed to deliver expanded foam gently onto a burning liquid.

Foam quality:

A measure of a foam's physical characteristics.

Foam solution:

A homogeneous mixture of water and foam concentrate.

Foam sprayer:

A device which delivers low expanded foam.

Foam stability:

The relative stability of a foam to withstand spontaneous collapse or breakdown from external causes, such as heat or chemical reaction.

Foam-water sprinkler system:

A system that is designed to discharge foam through open or closed sprinkler heads or sprayers. Design standard NFPA16.

Forcing foam maker (High back pressure foam generator):

A device used to aerate foam solution in fire protection systems that apply foam from beneath the surface of the flammable liquid. The forcing foam maker is usually located outside the dike area to protect it from fire.

Forestry foam:

A type of foam concentrate for use on class A fuels in vegetation fires.

Freezing point:

The temperature at which a foam concentrate solidifies.

Freeze / Thaw cycle:

The process of freezing and thawing out a foam concentrate to assess its storage stability.

Friction loss:

The loss of pressure in a flowing stream, resulting from resistance to flow imposed by the inside surface of pipes or hoses, and by changes in direction of the stream.

Fuel pick-up:

The characteristic of a fuel that is suspended or absorbed by expanded foam.

Fuel tolerance:

The ability of expanded foam to withstand contamination by hydrocarbon fuels.

Fugitive emissions:

A fugitive emission is a release of flammable vapours that continuously or intermittently occur from process equipment during operations.

G

Gelling:

The process where polymers in AR/AFFF foam concentrates turn into a gel when stored at low temperatures or when exposed to metal ions.

Glycol ether:

Ingredient in AFFF and AR/AFFF.

GPM:

Gallons per minute (either US gallons or Imperial gallons)

Gum or polymer:

Ingredient in AR/AFFF that comes out of solution when brought into contact with a polar solvent flammable liquid to form a physical barrier that separates the foam blanket from the polar solvent.

H

Hazard:

The potential to cause harm, including ill health and injury, damage to property, plant and equipment, products or the environment; production losses or increased liabilities

Hazmat:

Hazardous material

Heat resistance:

The ability of foam to withstand the effects of exposure to heat.

High back pressure foam generator:

A device to introduce air into the foam solution to produce expanded foam in a base injection system.

High expansion foam:

A special expanded foam designed for an expansion ratio > 1: 200

Hydrocarbon fuel:

Fuel based exclusively on chains or rings of linked hydrogen and carbon atoms. Hydrocarbon fuels are not miscible with water.

Hydrocarbon pick-up:

The characteristic of a fuel that is suspended or absorbed by expanded foam.

I

ICAO:

International Civil Aviation Organisation (UN). Publishes standards and recommendations on airport construction and safety.

IBC:

Intermediate bulk container. A palletised plastic container with metal protection with a liquid volume of 1000 litres.

Immiscible:

The inability of one liquid to mix with another.

Impingement:

The striking of a protected surface by water droplets issuing directly from a water spray nozzle

IMO:

International Maritime Organisation (UN). Publishes standards on safety at sea.. SOLAS (Safety of life at sea)

Induction rate:

The percentage at which a foam concentrate is proportioned into the water flow. Normally this is 1%, 3% or 6%, but may differ for a certain type of risk.

In-line inductor:

A device used to introduce foam concentrate into a water flow.

Insulated:

Refers to equipment, structures, or vessels provided with an encapsulating material that, for the expected duration of fire exposure, will limit steel temperatures to a maximum of 454°C for structural members or 343°C for vessels

ISO:

International Organization for Standardisation. A federation of the national standards bodies from about 100 countries.

J

Jet-A fuel:

Aviation kerosene. Also known as JP-5

Jet-B fuel:

Aviation fuel. A blend of gasoline and kerosene Also known as JP-4

K

k-factor or discharge coefficient:

Flow rate through an orifice or nozzle divided by the square root of the pressure; $k = Q/\sqrt{P}$.

L

Labelled:

Equipment or materials to which a label, symbol, or other identification mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation has been attached.

Landing zone:

The area on the fuel surface where the highest quantity of expanded foam lands.

Lastfire:

A study of the fire related risks associated with large diameter open-top floating roof storage tanks, sponsored by sixteen oil companies.

LC₅₀

Lethal concentration in water of a material such as foam concentrate that would kill 50% of the test batch of animals within a given period of time.

LEL:

Lower explosion level. The lowest concentration of a flammable vapour in air that can be ignited.

Line proportioner:

A device that siphons foam concentrate from a container to form foam solution.

Listed:

Equipment, materials or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material or services meets appropriate designated standards or has been tested and found suitable for a specified purpose. (NFPA)

LNG:

Liquefied Natural Gas

Low expansion foam:

An expanded foam with an expansion ratio < 1: 20.

LPG:

Liquefied Petroleum Gas

LR (Lloyd's Register):

Marine classification society from United Kingdom, publishes standards for the design, construction and survey of ships and marine structures. Approves fire fighting equipment.

M

Massed stream:

A foam application technique that directs one or more foam streams to converge and impact onto the surface in as small as possible area. This technique increases the localized application density.

Master plan fire & safety:

A drawing covering the entire site on which all fire detection systems, active fire protection systems and fire fighting equipment are indicated

Mechanical foam:

Foam produced by a physical agitation of a mixture of water, foam concentrate and air

Medium expansion foam:

An expanded foam with an expansion ratio between 1:20 and 1: 200

Mil Spec. F:

The US military specification MIL-24385F. A standard for testing AFFF foam concentrate.

Minimum use temperature:

The lowest temperature at which the foam concentrate can be used through conventional equipment such as venturi proportioning devices.

Miscible:

The ability of one liquid to mix with another liquid without separating into two layers.

Mitigation:

Measures taken to reduce the consequences of a (fire) incident

Monitor:

A fixed, portable or mobile device, designed to allow an operator to direct water or foam to a hazard.

MSDS (Material Safety Data Sheet)

Document that communicates hazards associated with a product to the user.

MTBE:

Methyl Tertiary Butyl Ether, a mildly polar flammable liquid used as a component in unleaded gasoline.

N

Newtonian:

A liquid that displays constant viscosity at various shear rates.

NFC:

National Fire Codes, USA standards for fire protection.

NFPA:

National Fire Protection Association (USA), publishes the National Fire Codes (NFC) standards.

NNI (Nederlands Normalisatie Instituut)

Dutch national organisation that publishes NEN standards.

Non-absorbing ground:

Earth or fill that is not readily permeable or absorbent to large quantities of flammable or combustible liquid or water, or both.

Non-aspirated foam:

Foam produced in equipment which does not deliberately entrain air into the foam solution. Only film forming foam concentrates are suitable for non-aspirating nozzles.

Non-Newtonian:

A liquid that displays different viscosity at different shear rates.

Nozzle:

A device designed for the throw of water or expanded foam in a required pattern.

O

Oscillating monitor:

A fixed, portable or mobile device designed to sweep water or foam automatically from side to side.

OTFR:

Open top floating roof tank.

P

Passive fire protection:

A system that performs its function without relying on the requirement of activation

pH value:

Measurement of acidity to alkalinity on a scale of 1 to 14. Neutral de-ionised water has a pH value of 7. Acidic is less than 7, alkaline is greater than 7.

Phase separation:

Separation of ingredients in a liquid mixture.

Pick-up rate:

The percentage at which a foam concentrate is proportioned into the water flow. Normally this is 1%, 3% or 6%, but may differ for a certain type of risk.

Pilot sprinkler:

An automatic sprinkler or thermostatic fixed temperature release device used as a detector to pneumatically or hydraulically release the system actuation valve.

Polar solvent:

This term is generally used to describe any flammable liquid which destroys standard foams, although it actually refers to liquids whose molecules possess a permanent dielectric charge. Examples of polar solvents are alcohols, ethers, amines, aldehydes and ketones. Polar solvents are generally miscible with water.

Polymer:

A water-soluble ingredient in AR/AFFF foam concentrates that comes out of the solution when brought into contact with a polar solvent.

Portable:

Easily transportable by hand.

Polymeric membrane:

A thin, durable, plastic layer formed on a polar solvent fuel surface protecting the foam cells from destruction by the fuel.

Pour point:

The lowest temperature at which a foam concentrate is fluid enough to pour, generally about 3°C (5°F) above the freezing point.

Pre-burn time:

The time between ignition of a fire and the commencement of foam application.

Premix solution:

A mixture in correct proportions of a foam concentrate and water, which can be stored for a specific time.

Pressure drop:

The net loss in flowing water pressure between any two points in the hydraulic system. It is the sum of friction loss, head loss and other losses.

Product:

Another name that can be applied to flammable liquid.

Proportioner:

The device where foam concentrate and water are mixed to form a foam solution.

Proportioning rate:

The percentage at which a foam concentrate is proportioned into the water flow. Normally this is 1%, 3% or 6%, but may differ for a certain type of risk.

Protein foam:

A hydrolysed natural protein solid combined with additives to form an organic based foam concentrate.

Protein foam concentrates:

Substance containing organic concentrates derived from natural vegetable or animal sources. Hydrolysed products of protein provide exceptionally stable and heat-resistant properties to foams.

Pseudo-plastic:

A non-newtonian displays a decreasing viscosity with an increasing shear rate.

Q

Quarter drain time:

The time required for 25% of the total liquid solution to drain from the expanded foam. Also refers to as the 25% drain time or quarter life.

R

Refractometer:

A device used to measure the refractive index value of a liquid. A changing amount of foam concentrate in water gives a changing refractive index value.

Remote control monitor:

A fixed device, designed to allow an operator to direct water or foam to a hazard by remote control.

Residual pressure:

The pressure existing in a fluid line at a specified flow.

Rim seal foam pourer:

A device designed to be installed on a floating roof tank and discharges aspirated foam gently onto the rim seal area.

Rundown:

The downward travel of water along a surface, caused by the momentum of the water or by gravity

S

Safe:

A condition in which all hazards inherent in an operation have either been eliminated or are controlled such that their associated risks are both below a tolerable thresholds and are reduced to a level which is as low as practical

Seal are:

The space between the foam dam and the tank shell on a floating roof tank. The seal area contains a mechanism that seals off combustible or flammable vapours from exposure to the atmosphere

Sediment:

The solid matter which can be centrifuged out of a foam concentrate

Semi- subsurface injection:

A system used for the protection of fixed roof hydrocarbon and water soluble fuel storage tanks where foam is directed to the fuel surface from the bottom of the tank through a flexible hose normally contained in a sealed container.

Shall:

Indicates a requirement (NFPA)

Shear rate:

The rate at which foam is subjected to shearing.

Shelf life:

The length of time in which a material will retain its original properties when stored according to the manufacturer's recommendations.

Should:

Indicates a recommendation or that which is advised but not required. (NFPA)

Skin fire:

A flammable liquid fire, such as a spill on a solid surface where the liquid is present in a depth not exceeding 25 mm (1 inch).

Sludge:

The solid matter which can be centrifuged out of a foam concentrate.

SOLAS:

Safety of life at sea. An IMO publication.

Soluble:

The ability of a liquid to become readily dissolved or mixed with another liquid.

SP:

Statens Prövningsanstalt, a Swedish institute for fire protection related research.

Specific gravity:

Density of a material divided by the density of water.

Sprayer (spray nozzle):

An open type device designed to discharge water or water-foam solution in a pre-determined pattern

Sprinkler:

An open non-air aspirating type sprinkler designed to discharge water or AFFF water-foam solution

Stability:

A term used with foam concentrates to determine the performance and security of a foam blanket.

Standard:

A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Non-mandatory provisions shall be located in an appendix or annex, footnote or fine print note and are not to be considered a part of the requirements of a standard.

Static pressure:

The pressure in a hydraulic system created by external forces such as a pump when no liquid is flowing.

Storage stability:

The ability of a foam concentrate to withstand long-term storage under varying environmental conditions.

Stovepipe:

A device intended to provide an open area of free burn during a burn back test on expanded foam.

Submerge:

The plunging of foam beneath the surface of burning liquid resulting in a breakdown of the foam structure and coating of the foam with the burning liquid.

Subsurface injection:

A system used for the protection of fixed roof hydrocarbon fuel storage tanks where fuel-resistant aspirated foam is injected into the base of the tank and rises through the fuel to the surface of the liquid.

Surface tension:

The tension in the interface between foam solution and air. Unit is Dyne/cm which is equivalent to mN/m

Surfactant:

Surface active agent. Chemicals that have the ability to alter the surface properties of water. (Abbreviation of Surface Active Agent)

Synthetic detergent foam concentrate:

A detergent-based foam that can be used up to high expansion but offers limited burn-back and heat resistance.

T

Thermal updraft:

High-velocity wind forces created by fire as hot combustion products rise into the air. As hot air rises it draws surrounding air into the fire. These winds can exceed velocities of over 110 km/h

Thixotropic:

The Tyco logo is rendered in a white, bold, italicized sans-serif font against a dark blue background.

*Fire Suppression
& Building Products*

A non-Newtonian liquid that displays a decrease in viscosity with time while it is subjected to constant shearing

Training foam:

A foam concentrate that is especially formulated for training purposes.

Type I outlet:

Discharge devices that conduct foam gently on to the liquid surface without submerge of the foam or agitation of the surface.

Type II outlet:

Discharge devices that do not deliver foam gently on to the liquid surface but are designed to minimise submerge of the foam or agitation of the surface.

Type III outlet:

Discharge devices that deliver the foam directly on to the surface of the liquid in a manner that causes general agitation.

U

UEL:

Upper explosion level. The highest concentration of a flammable vapour in air that can be ignited.

UL:

Underwriter's Laboratories, an American organization. Publishes standards of which are the UL-162 Standard for foam equipment and liquid concentrates and the UL Fire Protection Equipment Directory.

Ullage:

The space above a liquid in a storage tank to allow for volume difference due to thermal expansion.

Unaspirated foam:

Foam produced in equipment which does not deliberately entrain air into the foam solution. Only film forming foam concentrates are suitable for non-aspirating nozzles.

Upstream:

Opposite the direction in which the liquid is flowing or will flow.

USCG:

United States Coast Guard, an American organisation that publishes standards and approves foam liquids and equipment.

USGPM:

United States Gallons Per Minute, (3.785 times dm³/min)

V

Variable inductor:

A generally portable inductor capable of inducing foam concentrates at various percentages.

Vapour density:

The weight of a given volume of a vapour. Vapour from flammable liquids is more dense than air.

Vapour pressures:

The amount of vapour produced by a flammable or combustible liquid. A high vapour pressure liquid produces a large quantity of vapour.

Vapour suppression:

The ability of a foam to suppress hazardous vapours coming from the foam covered liquid.

VdS:

Verband der Schadeverhütung, a German institute for research, testing and approval of fire fighting equipment. Also publishes standards and codes of practice for fire prevention.

Velocity pressure:

The force provided by a moving stream of water. At a point of discharge in a hydraulic system, elevation pressure and static pressure are converted to velocity pressure.

Venturi:

A constricted portion of a pipe or tube which increases water velocity, thus momentarily reducing its pressure and simultaneously creating a vacuum. It is in this reduced pressure area that foam concentrate is introduced into the water stream.

Viscosity:

The thickness of a liquid or its ability to flow.

W

Water spray (system):

A fire protection system where the water supply is manually or automatically activated and the distribution piping discharging water in a form having a predetermined pattern, particle size, velocity, and density discharge from specially designed nozzles or devices.

Water wastage:

That discharge from water spray nozzles that does not impinge on the surface being protected.

Window:

A small, window-like opening in the flames of a fully-involved storage tank fire. The window is created by high- velocity wind forces which draw air into the fire through the window.

The Tyco logo is rendered in a white, bold, italicized sans-serif font against a dark blue background.

*Fire Suppression
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The location of the window changes with the wind direction, but it is typically found on the upwind side of the fire. The potential for losing foam to the thermal updraft is at its minimal point at this location.