

Index of Q&As Concerning Fire of Polyurethane Foams

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 Japan Urethane Industries Institute
 Fire Safety Committee

Index	Brief explanation	Flexible foam	Rigid foam
after flame	Residual flame. An after flame time is set as one of the criteria of non-combustible materials, quasi-noncombustible materials, and fire retardant materials in the Fire Services Act.	Q32	Q19, Q23
after glow	In a heating test assuming fire or combustion, flame remaining in a material even after removal of ignition sources	Q9, Q32	Q-Supplement
carbon monoxide	A colorless and odorless gas with the chemical formula CO. Less solubility into water. Very toxic gas. It is generated by incomplete combustion, such as charcoal and gas for fuel. It burns giving a blue flame, if ignited, when it then becomes carbon dioxide.	Q21, Q22, Q25, Q26, Q25-A	Q16, Q17, Q18, Q23, Q16-A
charring	Becoming charcoal. The phenomenon whereby an organic compound breaks down when heated due to lack of oxygen, and only carbon is left.	Q6	
combustion	An intense chemical reaction with emission of heat. It is often accompanied by an emission of light phenomenon. Generally, however among chemical combinations of inflammable materials and oxygen, it indicates emission of heat and light (the combustion of the candles, combustion of the charcoal, and combustion of magnesium are among these).		
combustion of surface	The phenomenon in which oxidization occurs only at the surface like a cigarette or charcoal is called combustion of surface. Unlike normal combustion, it is not accompanied by evaporation and decomposition but combustion on the solid surface.		Q23
composite material	Materials formed by combining two or more materials with very different properties. A composite material consists of a base matrix and reinforcing material.	Q31	
Cone Calorimeter	Testing device to measure parameters of a combusting sample. It gathers the change over time of data regarding the amount of heat generation, smoke quantity, mass loss, and combustion product gases; the device heats a sample using a cone type electric heater and ignites a sample using a spark.		Q14, Q15, Q23
deflagration	Among explosions caused by combustion, one in which the expansion speed (flame transmission speed) does not reach the speed of sound. Detonation is when the expansion speed exceeds the speed of sound.	Q15	
dust explosion	Rapid combustion of dust particles of any powdered combustible materials suspended in the air in an enclosed location with an ignition source..	Q17	Q-Supplement
early stage fire	Early unintentional or spreading combustion with the necessity for fire extinguishing.	Q8, Q26, Q32	Q8, Q13, Q16
fire	A combustion phenomenon that occurs or expands against the intention of a person/persons or one that results from arson that requires extinguishing. Also refers to an explosive phenomenon that occurs or spreads against the will of a person/persons. (Fire Services Act)	Q2, Q3, Q5, Q6, Q7, Q8, Q21, Q22, Q23, Q26, Q28, Q29, Q30, Q33, Q35	Q1, Q13, Q16, Q17, Q18, Q19, Q22, Q23, Q24, Q25
fire preventive construction	Structures certified or prescribed by the Minister of Land, Infrastructure and Transport such as steel net mortar coat or plaster coat that possess the required fire proof performance for external cladding and eaves that prevent fire from spreading when normal fires occur in the vicinity of buildings.	Q2, Q5, Q6, Q7, Q8, Q10, Q13, Q22, Q25, Q28, Q34	Q19, Q23
fire preventive material	Materials prescribed by the "Building Standard Law" which can be utilized as building materials or finishing materials for immobile constructions. Fire preventive materials are classified into 3 categories; "Non-combustible", "semi Non-combustible", "Incombustible". The certificate for each category is issued by the Ministry of Land, Infrastructure, Transport & Tourism.		Q23
fire resistance	Resistibility or durability of materials, parts or constructions towards fire.	Q24	Q19, Q21

fire retardant material	A type of fire-safe material that meets the technical standards specified in the Building Standard Act when heating (heating time: 5 minutes) in a normal fire.	Q7, Q28, Q32	Q19, Q21, Q22
fire risk	The potential for damage or injury caused by events related to fire (casualties) and property loss, and other economic damage	Q23, Q26, Q28	Q16
fire toxicity	Adverse effects on biological properties of harmful environmental factors such as the products of combustion occurring in a fire	Q21, Q22, Q25, Q26	Q16, Q17, Q18
fireproof construction	Among the main structures of buildings, such as walls, pillars, floors, beams, roofs, and stairs, those that conform to standards of fire-resistant performance, those that use structure methods prescribed by the Ministry of Land, Infrastructure and Transport, and those that are authorized by the Ministry of Land, Infrastructure and Transport.		
flame retardance	The characteristic of the material which delays propagation of a fire	Q31, Q32, Q33, Q34	
flame retardants	A substance which is added to a coating or polyurethane foam formulation to reduce or retard its tendency to burn. May be inorganic or organic compounds.	Q18	Q13
flame spread	Spread of a flame over a solid surface without heating from the outside, or spread of the front tip of a gas flame.	Q7	Q6, Q8, Q19
flammability	The property of combustion continuing at ordinary temperatures and pressures.	Q6, Q17, Q21, Q36	Q5, Q7
flash point	The minimum temperature to which vapor emitted by a substance that is heated can generate an inflammable mixture with air. At this temperature, if there is no source of ignition, combustion will not occur.	Q11	Q9
flashover	A flammable gas which accumulates in the an initial stages of a fire is ignited and flares up explosively.	Q5, Q8, Q30	Q4 , Q8, Q18
FMVSS 302	FMVSS: Federal Motor Vehicle Safety Standards. An American Flammability standard for car interior materials in which combustion evaluation is assessed by the combustion speed in the horizontal state.	Q27	
fully developed fire stage	The stage at which fire is present in the entire building, there is little black smoke, flames begin to erupt, and the danger of fire spreading increases. The temperature is more than 800°C. At the fully developed stage and later, in the case of a wooden house, the time to burn down is extremely short.	Q26	
gas hazard test	A test which ascertains the toxicity of a gas generated from a material by exposing mice to combustion gas until they are incapacitated.		Q19, Q23
gas poisoning	Poisoning from the inhalation of gas, such as carbon monoxide, hydrogen cyanide, and volatile organic chemicals like benzene.	Q22, Q26	Q16
harmful gas	Gasses and aerosol that are hazardous to humans	Q21, Q22, Q25, Q26, Q25-A	Q16, Q17, Q18, Q16-A
heat flux	The rate of a heat capacity to move a unit area.		
heat release rate	Energy released when a material combusts Unit is mW/m ² .	Q4, Q5, Q13, Q28	Q11, Q14, Q15, Q19, Q23, Q19-A, Q19-B
heat source	One of the combustion elements, which also include flammable substances and oxygen. Although it originates in temperature, flame, and sparks of static electricity, etc. are also applicable.	Q3, Q10, Q15, Q18	
hydrogen cyanide	Chemical formula: HCN, water-soluble compound with a boiling point of 26°C. Also known as hydrocyanic acid (for the gaseous state: hydrocyanic acid gas). LC ₅₀ :110-200 ppm (v/v). When a material including nitrogen burns, HCN is generated, but in a very small amount.	Q21, Q25, Q25, Q26, Q25	Q16, Q17, Q16-A
ignited material	The first substance to ignite from a source of ignition.	Q4	
ignition point	In the absence of combustion, the minimum temperature at which a substance will catch fire and continue to burn in air	Q10, Q11, Q12, Q15, Q20, Q36	Q9
ignition point	The minimum temperature at which a substance burns even if there is no flame.		

ignitability	The ease of catching fire. Ignitability means a combustion phenomenon started with intent by a person. It is also called lighting and starting a fire. It is distinguished from ignition which means combustion that begins without depending on the intent of a person.	Q10, Q28	Q19, Q20
index	Index for the isocyanate equivalent in the reaction with isocyanate and an active hydrogen component compound		
interior display mark	A mark in all the buildings that use inflammable foam resin thermal insulation in their interior that clearly shows information for fire fighting.		Q19, Q23
interior finishing restriction	A restriction for fire prevention prescribed by the Building Standard Act. Materials that can be used for interior decoration are decided by type of building.	Q29, Q30, Q31, Q32 Q31-A	Q22, Q23
isocyanate	Chemical substances that possess a functional group "-N=C=O". Polyisocyanate compounds, which have more than two isocyanate groups are used as raw materials for polyurethane.		Q10, Q13, Q14
lack of oxygen	The phenomenon whereby the atmospheric quantity of oxygen and underwater oxygen content of water decrease by the oxidation of a material.	Q25	Q16
lethal dose	Lethal dose (LD) is the amount of a given chemical or substance which causes death in an organism. LD values for human are generally estimated by extrapolating results from testing of animals or human cell cultures.	Q22	Q16, Q18, Q16-A
limited oxygen index	The minimum oxygen concentration at which combustion is sustained in a prescribed sample in a mixed gas of oxygen and nitrogen.	Q11	Q9
median lethal concentration	A statistical calculated value of the concentration at which 50% of laboratory animals die when exposed to a toxic material for a constant time. The higher the value, the lower the toxicity.	Q25	Q16, Q18, Q16-A
model box test	A test to measure the calorific value and heat generation rate when a flame source is burned inside of an indoor model made from construction materials (test materials).		
non-combustible material	A type of fire prevention material. It is evaluated in the Building Standard Act by a pyrogenic test or a model box test and a gas hazardousness test. When it is exposed to heating (for a heating time of 20 minutes) in the normal fire in a pyrogenic test, it passes as a fire prevention materials if it satisfies the technical standard prescribed in the Building Standard Act.	Q7, Q29, Q30, Q31, Q32	Q19, Q22, Q23, Q19-A
polyisocyanurate foam	The general term for a foam which intentionally contains isocyanate rings generated from trimerization reactions of isocyanate by using a specific catalyst. A polyurethane foam obtained from a polyol which has two or more hydroxyl groups reacts with polyisocyanate and a foaming agent to produce this foam.	Q19	Q12, Q13, Q14, Q15
polyol	The generic name of a compound having more than two hydroxyl groups (-OH). Polyols are the main ingredient of the B component which reacts with the isocyanate to produce polyurethane foam.		Q10
polyurethane foam	The general term for a high molecular compound that includes a urethane bond obtained by the polyaddition reaction of an isocyanate compound and a polyol compound, and also containing gas bubbles. Exists in the form of sponge.	general topic	general topic
pyrolysis	Thermochemical decomposition of organic materials at elevated temperature in the absence of oxygen. Flames generated from combusted plastics or wood are caused by gases generated by pyrolysis of these materials, but not generated directly by combustion of plastics or woods.	Q6, Q21, Q26	Q16, Q17, Q18
quasi-noncombustible material	Fire prevention material that meets the technical standard specified to the Building Standard Law when heated (for 10 minutes) in a normal fire.	Q29, Q30, Q32	Q6, Q22, Q23
self extinguishing	Property whereby a substance does not continue to burn after the external source of ignition is removed.	Q18, Q24	
semi-fireproof construction	Among the main structures of buildings such as walls, pillars, floors, a roofs, and stairs, intended to meet semi-fireproof criteria, and semi-fireproof in construction using the structures/methods established or authorized by the Minister of Land, Infrastructure and Transport.		
Smoke coefficient	The quantity of smoke evolved from the combustion or thermolysis of a material by unit weight (g) at a certain temperature is defined as the smoke coefficient (C, m ³ /g).	Q14	Q12

smoking	The property of smoke emitting from a source.	Q23, Q28	Q12, Q19, Q20, Q23, Q19-A
smoldering	The combustion form whereby smoke is emitted in large quantities without a flame because combustible mixtures cannot be formed by the gas generated from decomposition in cases where the vicinity is hypoxic (example; combustion of a cigarette or incense stick).	Q6, Q26	
soot	General term that refers to impure carbon particles resulting from the incomplete combustion of a hydrocarbon.		
spontaneous ignition	This phenomenon is one whereby when a combustible material is heated in oxygen or air, it emits and flame and starts to burn without being contacted by a pilot flame. It occurs when the material is heated to a temperature that is higher than its ignition point or fire point. Depending on various parameters, the temperature at which spontaneous combustion occurs (ignition point) varies greatly.	Q10, Q12	Q10
spray polyurethane foam	A polyurethane foam in which a polyol component and a polyisocyanate component are mixed together using a spray gun, and the two-component mixture is sprayed onto the application location. Polyurethane spray foam is produced on the construction site by the mixture expanding and curing. It is mainly used to insulate wall surfaces of houses, warehouses, or tanks.		Q12, Q15
spreading fire	One that expands into other compartments or other buildings from a fire in a particular compartment	Q5	Q6, Q8
contained combustible	In ignition in a normal environment, contained continuous combustion of inflammable materials.	Q4	
thermal inertia	The property of not warming immediately even when exposed to a heat source.	Q10, Q15	
thermal insulation	In general, materials that prevent which heat transmission by conduction, convection, and irradiation due to their raised heating and cooling efficiency.		Q1
UL Underwriter's Laboratories	Abbreviation of Underwriter's Laboratories Incorporated. A U.S.-based private sector organization. UL investigates, researches and tests whether materials, products, apparatuses, and systems throughout the world are hazardous to people, formulates safety standards for these products, and generally discloses information regarding these. In addition, materials that meet these standard are labeled as such and certificates are issued.	Q27, Q28	