



Corona Fire Department

Hazardous Materials Definitions Per 2016 California Fire Code

PURPOSE

The purpose of this guideline is to provide definitions specific to hazardous materials, as contained in the 2016 California Fire Code.

SCOPE

The definitions below are intended to assist businesses in classification of materials in use, storage and/or handling. Materials meeting these definitions are required to be evaluated for potential code and reporting requirements. Generally, hazardous materials present two types of hazards; physical and/or health hazards. When a material has characteristics that represent multiple hazard classifications, it is important to evaluate all hazards in order to determine code requirements and methods of providing safety to employees, businesses and the community. This guide is designed to provide information for both Chemical Classification reports, as well as Hazardous Materials Business Emergency Plans.

DEFINITIONS

Physical Hazards	Health Hazards
Fire: <i>Flammable liquids</i> ; 1A, 1B, 1C <i>Combustible liquids</i> ; II, IIIA and IIIB, <i>Pyrophorics, Oxidizers</i> ; Class 1, 2, 3, 4, <i>Flammable Solids, Aerosols</i> ; Class 1, 2, 3 <i>Flammable Cryogenic</i> liquids	Acute Health Hazards (immediate): <i>Highly Toxic, Toxic, Irritants, Corrosives, Cryogenic liquids</i>
Reactive: <i>Unstable Reactive</i> ; Class 1, 2, 3, 4, <i>Organic Peroxides</i> ; Class I, II, III, IV, V, <i>Water Reactive</i> ; Class 1, 2, 3	Chronic Health (delayed): <i>Irritants</i> or <i>other hazardous chemicals</i> with an adverse effect from long term exposure
Pressure Release: <i>Explosives, Compressed Gases, Blasting Agents, Aerosols</i> ; Class 1, 2, 3, <i>Cryogenics</i>	

EXPLOSIVE (EX)

Explosive is a chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters and display fireworks, 1.3G.

The term “explosive” includes any material determined to be within the scope of USC Title 18, Chapter 40 and also includes any material classified as an explosive other than consumer fireworks, 1.4G by the hazardous materials regulations of DOTn 49 CFR Parts 100-185.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap where unconfined.

Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to, black powder, safety fuse, igniters, igniter cord, fuse lighters, fireworks, 1.3G and propellants, 1.3C.

Mass-detonating explosives. Divisions 1.1, 1.2, and 1.5 explosives alone or in combination, or loaded into various types of ammunitions or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms “high” and “low” explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each division noted (for example, the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).

Division 1.1. Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

Division 1.2. Explosives that have a projection hazard but not a mass explosion hazard.

Division 1.3. Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard, or both, but not a mass explosion hazard.

Division 1.4. Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5. Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

Division 1.6. Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

COMPRESSED GASES

A material, or mixture of materials which:

1. Is a gas at 68°F or less at 14.7 psia of pressure; and
2. Has a boiling point of 68°F or less at 14.7 psia which is either liquefied, nonliquefied, or in solution, except those gases that have no health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia at 68°F.

The states of a compressed gas are categorized as follows:

1. Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure, entirely gaseous at a temperature of 68°F.
2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F.
3. Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.
4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

Corrosive Compressed Gas (CorCG): A compressed gas that also meets the criteria for a corrosive material.

Highly Toxic Compressed Gas (HToxCG): A compressed gas that also meets the criteria for a highly toxic material.

Toxic Compressed Gas (ToxCG): A compressed gas that also meets the criteria for a toxic material.

Inert Compressed Gas (ICG): A compressed gas that exhibits no chemical activity, will not react with any other chemical, and is harmless to persons, animals, and the environment.

Oxidizing Compressed Gas (OxCG): A compressed gas that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen and/or other gases.

Flammable Compressed Gas (FLG): A material that is a gas at 68°F or less at 14.7 psia of pressure [a material has a boiling point of 68°F or less at 14.7 psia] which:

1. Is ignitable at 14.7 psia when in a mixture of 13 percent or less by volume with air; or
2. Has a flammable range at 14.7 psia with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psia of pressure and a temperature of 68°F in accordance with ASTM E 681.

Liquefied Petroleum Gas (LPG): A material that is composed predominantly of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutane), and butylenes.

FLAMMABLE & COMBUSTIBLE LIQUIDS

Flammable Liquid: A liquid having a closed cup flash point below 100°F. Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class I-A (FL-IA) Liquids having a flash point below 73°F and having a boiling point below 100°F.

Class I-B (FL-IB) Liquids having a flash point below 73°F and having a boiling point at or above 100°F.

Class I-C (FL-IC) Liquids having a flash point at or above 73°F and below 100°F.

Combustible Liquid: A liquid having a closed cup flash point at or above 100°F. Combustible liquids shall be subdivided as follows:

Class II (CL-II) Liquids having a closed cup flash point at or above 100°F and below 140°F.

Class III-A (CL-III A) Liquids having a closed cup flash point at or above 140°F and below 200°F.

Class III-B (CL-III B) Liquids having a closed cup flash point at or above 200°F.

FLAMMABLE SOLIDS (FLS): A solid substance, other than a blasting agent or explosive, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16CFR; Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.0866 inch per second along its major axis.

ORGANIC PEROXIDES: An organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can present an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.

Classification of organic peroxides according to hazards:

Class I (OP-1): Describes those formulations that are capable of deflagration but not detonation.

Class II (OP-2): Describes those formulations that burn very rapidly and that pose a moderate reactivity hazard.

Class III (OP-3): Describes those formulations that burn rapidly and present a moderate reactivity hazard.

Class IV (OP-4): Describes those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V (OP-5): Describes those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified detonable: Organic peroxides that are capable of detonation. These peroxides pose an extremely high-explosion hazard through rapid explosive decomposition.

OXIDIZERS: A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials, and if heated or contaminated, can result in vigorous self-sustained decomposition.

Classification of liquid and solid oxidizers according to hazard:

Class 4 (OXY-4): An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock, and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Class 3 (OXY-3): An oxidizer that causes a severe increase in the burning rate of combustible material with which it comes in contact.

Class 2 (OXY-2): An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 1 (OXY-1): An oxidizer that does not moderately increase the burning rate of combustible materials.

PYROPHORIC MATERIALS (PYRO): A chemical with an autoignition temperature in air, at or below a temperature of 130°F.

UNSTABLE (REACTIVE) MATERIAL : A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense, or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction, or shock, or in the absence of an inhibitor, in the presence of contaminants, or in contact with incompatible materials.

Classification of unstable reactive chemicals according to hazard:

Class 4 (UR-4): Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

Class 3 (UR-3): Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2 (UR-2): Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1 (UR-1): Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.

WATER-REACTIVE MATERIALS: A material that explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.

Classification of water-reactive chemicals according to hazard:

Class 3 (WR-3): Materials that react explosively with water without requiring heat or confinement.

Class 2 (WR-2): Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases, or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.

Class 1 (WR-1): Materials that react with water with some release of energy, but not violently.

CRYOGENIC FLUIDS (CRY): A fluid having boiling point lower than -130°F at 14.7 psia at 14.7 pounds per square inch atmosphere (psia)(an absolute pressure of 101.3 kPa).

Flammable Cryogenic Fluids (FCRY): A cryogenic fluid that is flammable in its vapor state.

HIGHLY TOXIC MATERIALS (HTOX): A material which produces a lethal dose or lethal concentration which falls within any of the following categories:

1. A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC50) in air of 200 ppm by volume or less of gas or vapor, or 2 mg/L or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, may not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation that is required for precise categorization of this type of material shall be performed by experienced, technically competent persons.

TOXIC MATERIAL (TOX): A material falling within any of the following categories:

1. A chemical that has a median lethal dose (LD50) of more than 50 mg/kg, but not more than 500 mg/kg of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD50) of more than 200 mg/kg but not more than 1,000 mg/kg of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms grams each.

3. A chemical that has a median lethal concentration (LC50) in air of more than 200 ppm but not more than 2,000 ppm by volume of gas or vapor, or more than 2 mg/L but not more than 20 mg/L of mist, fume, or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

CORROSIVE (COR): A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR Part 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

IRRITANT (IRR): A chemical which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of CPSC 16 CFR Part 1500.41 for an exposure of four or more hours or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is classified as an eye irritant if so determined under the procedure listed in CPSC 16 CFR 1500.42 or other approved techniques.

AEROSOLS (AERO-1, AERO-2, AERO-3): A product that is dispensed from an aerosol container by a propellant. Aerosol products shall be classified by their chemical heats of combustion and shall be designated Level 1, Level 2 or Level 3.

Level 1 aerosol products: Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb).

Level 2 aerosol products: Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb, but less than or equal to 13,000 Btu/lb.

Level 3 aerosol products: Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb.