

## Safety Ratings Explained

Please note: This article is meant as a guide to navigate flashlight safety ratings. Please see lights for specific approvals and consult with your Safety Department for appropriate lighting choices.

### What is a safety rated flashlight?

A flashlight that is “safety rated” can be safely operated in an area where explosive gases, liquids, dusts or fibers are present or may be present. In short, safety rated flashlights are designed to not be a source of ignition in potentially hazardous environments. These flashlights are generally tested by a certification company such as Underwriters Labs (UL). The rating system is composed of Classes, Divisions, Groups and Temperature codes. Classes identify the type of hazardous material present in the air. Divisions designate the probability that an ignitable concentration of that hazardous material is present. Groups identify what elements are present that have the potential to cause an explosion. Temperature codes list the maximum surface area temperature of the equipment.

#### Classes:

Classes designate what hazardous materials are present that could cause an explosion.

Class	Type of Hazardous Material
Class I	Flammable gases, vapors, or liquids. Examples of Class I locations are petroleum refineries, utility gas plants, gasoline storage and dispensing areas, and dry cleaning plants.
Class II	Combustible dusts. Examples of Class II locations are grain elevators, coal preparation plants, and producers of plastics, medicines, and fireworks, spices, sugar, and cocoa.
Class III	Ignitable fibers and flyings. Examples of Class III locations are textile mills and plants that create sawdust as a byproduct.

#### Divisions:

Divisions designate the probability that an explosion will occur. When a hazardous material is expected to be present in everyday operations, the condition is called *normal* (Division 1). When a hazardous material will be present only through an accidental rupture or faulty operation, that condition is called *abnormal* (Division 2).

Division	Presence of Hazardous Material
Division I	Where ignitable concentrations of flammable gases, vapors, or liquids can exist all of the time or some of the time under normal operating conditions. Examples of a Division 1 location are loading zones or areas near relief valves at a petroleum refinery because flammable

	hazardous materials exist under normal operations.
Division II	Where ignitable concentrations of flammable gases, vapors, or liquids are not likely to exist under normal operating conditions. An example of a Division II location is a storage room with oil drums. An ignitable concentration of gas vapors would only exist under abnormal operating conditions, if a drum were to be leaking.

**Groups:**

Groups identify what elements are present that have the potential to cause an explosion. Groups A-D apply to Class I locations. Groups E-G apply to Class II locations.

Group	Nature of Hazardous Material
Group A	Acetylene (usually used in welding)
Group B	Hydrogen or gases of equivalent hazard (includes ethylene oxide, propylene oxide, etc)
Group C	Ethylene or gases of equivalent hazard (includes carbon monoxide, ether, etc)
Group D	Propane (includes butane, gasoline, natural gas, ammonia, hexane, ethanol, etc)
Group E	Metal dust (division 1 only – includes aluminum and magnesium dust)
Group F	Coal dust (includes charcoal dust, coal, etc)
Group G	Grain dust (includes starch, flour, etc)

**Temperature Codes:**

Ignitable gases or combustible dusts can ignite when they come into contact with a hot surface. For example, the ignition temperature of gasoline is 536°F, whereas the ignition temperature for charcoal is 660°F. Temperature codes indicate the maximum surface area temperature of the equipment that can come into contact with the hazardous materials. Temperature codes only apply to Class I and Class II locations.

Temperature Code	Max Surface Temp °F	Max Surface Temp °C

T1	842	450
T2	572	300
T2A	536	280
T2B	500	260
T2C	446	230
T2D	419	215
T3	392	200
T3A	356	180
T3B	329	165
T3C	320	160
T4	275	135
T4A	248	120
T5	212	100
T6	185	85

Let's quickly review. Hazardous locations are classified in four ways: TYPE, PRESENCE, NATURE, and TEMPERATURE.

There are three *types* of hazardous conditions: Class I – flammable gas, vapor, and liquid, Class II – combustible dust, and Class III – ignitable fibers and flyings.

There are two kinds of hazardous *conditions*: Division 1 – normal, and Division 2 – abnormal.

There is the *nature* of the hazardous material. Groups A-D in Class I locations and Groups E-G in Class II locations.

Finally, there is the maximum surface *temperature* of the equipment. In certain environments if the equipment gets too hot, it could cause the hazardous material to ignite on contact.

Let's illustrate our Code "translation" with an example. How would we classify a storage area where gasoline is contained in closed tanks? Gasoline is a Class I substance (gas, liquid, or vapor). It's Division 2 because it would only be in the atmosphere if an accidental rupture or leakage occurred. It is Group D material (Propane group) with a T2A Temperature Code (gasoline has an autoignition temperature of 536°F).

### **Intrinsic Safety:**

When a flashlight is referred to as "[intrinsically safe](#)," this means a couple of things. First of all, it means that the flashlight is designed not to produce sparks, or at least not to produce sparks that have enough energy to ignite the surrounding material. Intrinsic safety also protects against abnormally high temperatures of small components inside the flashlight. If there was an internal short inside the light, the temperature of that component could rise well above the normal operating temperature. In intrinsically safe flashlights, safety measures are put in place to ensure that no one component of the flashlight can reach a temperature that would ignite the hazardous materials in the surrounding atmosphere.

What is the difference between a UL safety rated flashlight and a flashlight deemed intrinsically safe? Many people use the term "intrinsically safe" in a general way to mean any flashlight that has safety approvals. The reality is that a flashlight is only intrinsically safe for the specific environment it was tested for. For example, a Class I, Div 1 flashlight is intrinsically safe for a Class I, Div 1 environment, but it is not necessarily intrinsically safe for a Class II, Div 1 environment.

### **Explosion Proof:**

The term "explosion proof" means that the housing of the device has been engineered to contain an explosion. Should the hazardous materials penetrate the housing and become ignited by an internal component of the device, the explosion will stay contained within the housing.

Many people confuse "explosion proof" and "intrinsically safe" with safety-rated, but they are not necessarily the same. Intrinsically safe flashlights are designed not to ignite the surrounding atmosphere, whereas explosion proof equipment is designed to contain an explosion after it happens. Intrinsically safe flashlights PREVENT an explosion. Explosion proof equipment CONTAINS an explosion. Virtually all safety rated handheld flashlights are intrinsically safe for their specific environments; they are NOT "explosion proof," nor should they be. The explosion proof term is meant for larger, permanent equipment that can be constructed of stainless steel or cast aluminum to adequately contain an explosion.

Well, that about sums it up for flashlight safety ratings. It's a lot of information to sort through, but it could help prevent a serious accident by figuring out exactly what type of safety ratings you require for your flashlight. You can find a wide variety of [safety-approved flashlights](#) on [BrightGuy.com](#).

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**Sources:**

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