

# UNDERSTANDING INTRINSIC SAFETY

## DIVISION



All Intrinsically Safe flashlights are rated Division 1.

**Division 1:** "Hazard Likely" This is a location where an ignitable concentration of flammable material is present under normal operation conditions

**Division 2:** "Hazard not Likely" This is a location where an ignitable concentration of flammable material is present under abnormal operation conditions, not under normal ones, but where a fire or explosion could occur.

## CLASS



This rating is further broken down into Classes, which depend on the type of flammable material the flashlight might encounter.

**CLASS I:** Represents flammable gasses, vapors and liquids.

**CLASS II:** Is reserved for combustible dusts.

**CLASS III:** Includes ignitable fibers and flyings.

## GROUP



Each Class is then broken into Groups to further classify hazard materials that have similar characteristics, more importantly their ignition-related properties.

*(See the table below for the actual temperature and examples of the materials)*

**GROUP A:** Acetylene

**GROUP B:** Acrolein, arsine, butadiene, ethylene oxide, propylene oxide, propyl nitrate, hydrogen

**GROUP C:** Acetaldehyde, allyl alcohol, n-butyraldehyde, carbon monoxide, crotonaldehyde, cyclopropane, diethyl ether, diethylamine, epichlorohydrin, ethylene, ethyl ether, ethylenimine, ethyl mercaptan, ethyl sulfide, hydrogen cyanide, hydrogen sulfide, morpholine, 2-nitropropane, tetrahydrofuran, and unsymmetrical dimethyl hydrazine.

**GROUP D:** Acetic acid (glacial), acetone, acrylonitrile, ammonia, benzene, butane, 1-butanol (butyl alcohol), 2-butanol (secondary butyl alcohol), n-butyl acetate, isobutyl acetate, di-isobutylene, ethane, ethanol (ethyl alcohol), ethyl acetate, ethyl acrylate (inhibited), ethylene diamine (anhydrous), ethylene dichloride, ethylene glycol monomethyl ether, gasoline, heptanes, hexanes, isoprene, isopropyl ether, mesityl oxide, methane (natural gas), methanol (methyl alcohol), 3-methyl-1 butanol (isoamyl alcohol), methyl ethyl ketone, 2-methyl-1-propanol (isobutyl alcohol), 2-methyl-2-propanol (tertiary butyl alcohol), petroleum naphtha, pyridine, octanes, pentanes, 1-pentanol (amyl alcohol), propane, 1-propanol (propyl alcohol), 2-propanol (isopropyl alcohol), propylene, styrene, toluene, vinyl acetate, vinyl chloride, xylenes

**GROUP E:** Combustible metal dusts, including aluminum, magnesium and their commercial alloys

**GROUP F:** Carbonaceous dusts, including coal, carbon black, charcoal and coke

**GROUP G:** Dusts not included in Groups E and F, including wood, plastics, flour, starch, grain or chemical dusts

## TEMPERATURE



Finally, as a double check, the flashlight it is given a "T" rating, which is based on the highest temperature any part of the flashlight can reach while in use or when something goes wrong like a short circuit in the light.



Summary of Temperature Classes in Celsius  
(Maximum Temperature of any component in the Flashlight)

Temp Class	Max Surface Temp of Flashlight	Ignition Temp of Material
T6	85° c	>85° c
T5	100° c	>100° c
T4	135° c	>135° c
T3	200° c	>200° c
T2	300° c	>300° c
T1	450° c	>450° c

Summary of Self Ignition Temperatures & Class Rating for Flammable Gasses

Acetaldehyde	175° c	T4	Ethylene	450° c	T2
Acetic acid	463° c	T1	Ethyl acetate	425° c	T2
Acetic anhydride	315° c	T2	Ethylene ether	425° c	T2
Acetone	465° c	T1	Ethylene glycol	398° c	T2
Acetylene	300° c	T2	Ethyl & Methyl ether	190° c	T4
Ammonia	650° c	T1	Hydrogen	500° c	T1
Benzene	498° c	T1	Hydrogen sulfide	260° c	T3
Benzaldehyde	190° c	T4	Methanol	385° c	T2
Carbon disulfide	90° c	T6	Methane	535° c	T1
Carbon ether	605° c	T1	Methylhydrazine	194° c	T4
Cyclohexane	245° c	T3	Naphtalene	525° c	T1
Diesel fuel	250° c	T3	Octyl acetate	268° c	T3
Dibutyl Ether	194° c	T4	Phenol	715° c	T1
Diethyl Ether	160° c	T4	Propane	450° c	T2
Dipentyl ether	170° c	T4	Trimethylamine	190° c	T4
Dipropyl ether	188° c	T4	1,2-Dichlorethane	410° c	T2
Ethane	472° c	T1	1,4 Dioxane	180° c	T4
Ethanol	363° c	T2	2-Methylpropanal	196° c	T4