

# Class 1: What's Different About Explosives?

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# Purpose

Identify the key differences between Class 1 and other Dangerous Goods.

Class 1: What's Different About Explosives?

# Key Topics

- What Are Explosives?
- Explosives Divisions
- Explosives Compatibility Groups
- Who Can Classify Explosives?
- EX#'s in the US
- Other General Differences

# What Are Explosives?

Not everything classified as an explosive "explodes". Many "explosives" are not easy to ignite and may be less dangerous upon ignition than flammable gases or liquids.\*

\* "Smokeless Powder & the Fire Service" video, Sporting Arms & Ammunition Manufacturers' Institute

# What Are Explosives?

49 CFR 173.50 defines an explosive as follows: "For the purposes of this subchapter, an explosive means any substance or article, including a device, which is designed to function by explosion (i.e., an extremely rapid release of gas and heat) or which, by chemical reaction within itself, is able to function in a similar manner even if not designed to function by explosion, unless the substance or article is otherwise classed under the provisions of this subchapter. The term include a pyrotechnic substance or article, unless the substance or article is otherwise classed under the provisions of this subchapter.

# What Are Explosives?

Regardless if they show no explosivity in transport, materials are classified as explosives if they are manufactured with the view to producing a practical explosive or pyrotechnic effect. Therefore a continual need exists for "explosives" shippers to educate carriers, insurers, etc. about the relative safety of their products.

# What Are Explosives

*The difference between explosives and other dangerous goods is not that they explode and other dangerous goods don't. The difference is that "explosives" are intended to explode when used.*

# Key Topics

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# Explosives Divisions

Using the UN Tests & Criteria manual, explosives in Class 1 are divided into six divisions (49 CFR 173.50):

Division 1.1 consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously. Examples: high explosives, black powder

Division 1.2 consists of explosives that have a projection hazard but not a mass explosion hazard. Typically devices such as military weapons.

Division 1.3 consists of 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. Examples: modern gun powder, fireworks.

# Explosives Divisions

Division 1.4 consists of explosives that present 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. Example: Fireworks "snakes", sporting ammunition outside the US.

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

Division 1.6 consists of extremely insensitive articles which do not have a mass explosive hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation. Examples: Very infrequently used. Being considered for wetted explosives.

# Explosives Divisions

The majority of explosives are forbidden to ship by passenger or cargo aircraft without a special permit (e.g. Atlas Air). 1.4S is the most desired explosives classification, as it can typically be shipped economically by aircraft internationally, and in the US may be shipped by UPS or FedEx. Unlike most Class 1 materials, 1.4S is considered safe for firefighting.

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# Explosives Compatibility Groups

Unlike other dangerous goods, explosives have their own segregation system called Compatibility Groups.

One major reason for compatibility groups is to prevent mixed cargo of bulk explosives and initiating explosives. For example, it is prohibited to ship blasting caps with blasting explosives.

# Explosive Compatibility Groups

*The difference between explosives and other dangerous goods is that not only do explosives shipments have to follow the segregation table, they also have to follow the compatibility table.*

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# Who Can Classify Explosives?

With few exceptions, such as sporting ammunition and fireworks using the APA standard, explosives may not be self-classified. The approval steps in the US are:

- 1) Perform testing conducted or witnessed by a certified 3rd party laboratory, who generates a test report.
- 2) Send a written request for approval to the transportation regulatory authority.
- 3) Receive a written approval including official name and EX#.

Each country, or governing unit such as the CE, requires an approval. The US and other countries typically honor reciprocity to avoid duplication of work.

# Who Can Classify Explosives?

*The difference between classifying Class 1 explosives and other dangerous goods is that Class 1 goods usually cannot be self classified.*

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# EX#'s in the US

EX#'s are a key difference for day-to-day shipments of explosives. An EX# is simply a filing number assigned by the US DOT to every material for which it receives an application for explosives approval. EX means explosive (not “exemption”).

# EX#'s in the US

49 CFR 172.320 states that when an approved explosive is shipped, it must have the corresponding EX# marked on the package. There are a number of exceptions to this rule included in 172.320:

- 1) A product code may be used in lieu of an EX# if it appears on the written explosives approval.
- 2) When more than 5 different explosives are in a package, only 5 EX#'s need to be marked.
- 3) The shipping paper may be marked instead of each package in the shipment.
- 4) Sporting ammunition, being self classified, is not subject to EX#'s.

# EX#'s in the US

*The difference between marking Class 1 explosives and other dangerous goods is that Class 1 has an additional marking required called an EX#.*

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# Other General Differences

Explosives in Divisions 1.1, 1.2 and 1.3 are typically regulated more strictly than other dangerous goods. Higher insurance levels apply, placarding exceptions are not usable, route plans are required, attendance rules are tighter, security plans are required, etc.

# Other General Differences

Unlike other dangerous goods, the degree of packaging plays a strong role in the degree of danger from fire, and affects the final classification. Some explosives may be highly controlled by compartmentalization.

# Other General Differences

Sporting ammunition, a 1.4S material, has been downgraded to ORM-D. This is due to its generally innocuous behavior in a fire.

Sporting ammunition is therefore less strictly regulated than most dangerous goods. A similar example is that 1.3C gun powder may be reclassified to a flammable solid with appropriate testing.

# Summary

- Explosives are designed to explode.
- They are divided into 6 divisions.
- Compatibility groups are an additional segregation system
- Normally you cannot self-classify Class 1
- EX#'s are required on shipments.
- 1.3 and above have extra requirements.

# Class 1: What's Different About Explosives?

## Thank You!

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