Transporting Californium-252

Safely and Efficiently

Frontier Technology Corporation
WORLD'S EXPERT IN NEUTRON SOURCES

Californium-252 (Cf-252) is a radioactive chemical element that was discovered in 1950 at the University of California Radiation Laboratory. Since then, **Cf-252** has become a leading neutron source for a variety of applications ranging from neutron spectroscopy to gold and silver prospecting, and much more.

Strong neutron emissions from Cf-252 enable it to serve as a powerful fuel and information source. However, the element's extremely radioactive nature can create health risks if one is directly exposed to it. Just one microgram of Cf-252 can release 170 million neutrons per minute, and, if ingested, can damage the skeleton, liver, and other parts of the body.

Thus, it is crucial to ensure that strong safety measures are implemented when handling and transporting Cf-252, to ultimately prevent harm from radiation exposure. Additionally, making sure that the source arrives fully intact will optimize its performance in use and its effective lifespan.

How can you make sure that your Cf-252 source will get from point A to B without any incident or damage? This eBook provides an overview of which containers work best to ensure safety during Cf-252 transport, as well as the regulations and procedures to keep in mind when looking to acquire sources.

Type-A Packaging for Safe Cf-252 Transport

Any shipment of radioactive material is strictly regulated by federal law. Federal regulations are designed to protect transportation workers, the general public, and the environment from the harmful effects of radiation exposure.

For any given shipment, the packaging classification mandated by federal regulations depends upon the activity, type, and the form of the material in question. Radioactive material is generally shipped in one of the three following types of containers:

- Industrial containers
- Type-A containers
- Type-B containers

For Cf-252 transport, Type-A packaging is often the ideal choice, as most applications that use Californium require a relatively small but significant amount of Cf-252 to achieve complete functionality. Type-A packages are well suited for transporting such low-volume quantities of radioactive material.

In order to be certified “Type-A,” a package design must meet very specific criteria. These criteria simulate common conditions experienced during transport.

To meet these criteria, Type-A package designs must pass four critical tests:

- A continuous water spray for one hour, which simulates a rainfall ratio of 2” per hour.
- A free-fall drop onto a hard, flat surface. The distance from which the container is dropped can range from 0.3 m (0.98 ft) to 1.2 m (3.93 ft), depending on package mass.
- A stacking or compression test. The amount of weight used in the compression test must be at least five times the weight of the package.
- A penetration test. A 6-kg (13.2-lb) bar with a diameter of 1.25” is vertically dropped onto the container from a height of about 1 m (3.3 ft).

Type-A packages come with a wide range of customization capabilities. Containers can be adapted to meet a wide variety of sizes, shielding capacities, and configurations depending on the specified requirements.

Clearing Regulations for Cf-252 Transport Efficiency

There are several documents and procedures involved to ensure the efficient domestic or international transport of Cf-252. Your Cf-252 manufacturer is responsible for providing proper labeling, including a clear specification that the package in question contains radioactive material.

For domestic shipping, it's essential that a Cf-252 customer owns a Radioactive Materials (RAM) license issued either by the Nuclear Regulatory Commission (NRC) or a state agency.

International shipping requires that the customer possesses a country-specific import license.

It's important to confirm that your Cf-252 manufacturer owns the following licenses and upholds the following regulatory standards:

- RAM license(s)
- State- or province-specific licenses
- Nuclear Regulatory Commission guidelines
- International Organization for Standardization (ISO) 2019 standards
- American Society for Testing and Materials (ASTM) standards
- American National Standards Institute (ANSI) standards

Ensuring that these requirements are met early on in the transportation process will help you avoid long delays and any potential pain points at customs. In turn, you'll be able to streamline the transportation of your Cf-252 and implement it within the desired application as soon as possible.

Safely Installing Cf-252

After the Cf-252 has arrived at the target destination and before it is installed, it's imperative to make sure that it is stored in a safe location, such as a secure, low-traffic area within a warehouse. As the source's drum lid notes, ensure that no one in receiving opens the container upon receiving it.

Customers should secure the source drums in a storage area that is safe—our customers typically lock up or rope off the area. Once authorized and licensed technicians arrive at the facility, they will be able to open the sources and install the Cf-252 as needed. An authorized radioactive material specialist of your choice will be able to perform necessary inspections and will have the correct equipment to safely unload your sources so that they're ready to go.

Safe and Efficient Transport of Cf-252

Due to the extremely radioactive nature of Cf-252, it must be transported safely and efficiently. Type-A packaging provides a highly effective shipping solution for Cf-252. Preparing all necessary documents and procedures for the transportation process will help you avoid long lead times and difficulties at customs. Once the Cf-252 source arrives at the designated location, a trained and licensed specialist should be brought in to inspect, unload, and install the source.

At Frontier Technology Corporation, our services include the efficient transportation of californium-252 and responsible, fee-free source return once it is depleted. We build customized Type-A shipping containers in-house according to the highest quality standards. Our containers meet international shipping regulations, are certified by the Federal Trade Commission as USDOT Type-A, Specification 7A packages, and keep the Cf-252 sources fully intact in transit.

Our team of source specialists can provide tailored help in selecting a suitable Cf-252 container, taking into account factors such as the required source size and external radiation levels. If you'd like to learn more about how to safely and efficiently transport Cf-252 to your location, or about any of FTC's Cf-252 capabilities and services, reach out to us today.

About Us

Frontier Technology Corporation (FTC) is the world leader in californium-252 neutron source manufacturing and design, and is the foremost expert in logistics and shipping of radioactive material.

Founded in 1984 by Treva Janzow and the late Edward Janzow, Frontier Technology is located in Xenia, Ohio. Frontier Technology has over 40 years of industry experience in providing the highest-quality neutron sources, PINS sources, nuclear start-up rods, TYPE-A shipping containers, WEP shielding, and antimony-beryllium pellets.

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