

Troxler Electronic Laboratories, Inc.
Type A Certification
Model 128501 Case and 4640 Series Gauges

Design and general information

The shipping case (packaging) container is designed to secure model 4640 series nuclear gauge and protect it from incidents during normal transportation and shipping. It provides cavities to secure the gauge and accessories.

The models included in this evaluation are the Troxler Model 4640 Moisture Density Gauge. All of these gauges are similar enough in construction, dimensions, and specifics to be evaluated as a single unit.

Construction

The Troxler Model 128501 Shipping Case is a double-wall case manufactured of low-density polyethylene (LDPE). The double-wall construction provides individual cavities within the case to securely position and hold the gauge and its accessory items. The exterior surface of the case is thickened at its outside edges and corners to provide additional durability during rough handling. The container is constructed of ultraviolet (UV)-stabilized rotational grade polyethylene intended for rugged industrial use in material handling and shipping cases.

The case is constructed by rotational molding, wherein the material is heated and distributed throughout the mold. When cooled and solidified, the material forms a continuous homogenous structure with interior and exterior surfaces. Hardware attachment inserts are placed in the mold prior to molding to provide reinforced mounting locations for post-installed hardware.

Other items included in the package are components such as a gasket for weather resistance, plated steel hinges and draw latches for opening and securing the lid, a steel stay lid, and other components for construction.

Dimensions and weight

- The dimensions of the case are 31.5 in. (L) x 20.5 in. (W) x 15.5 in. (H).
- The weight of an empty case is 39 lb.
- The weight of a fully loaded case (i.e., a case that contains a gauge and its accessories) is 81.2 lb.

Closures and closure system

Packing of the case and placement of materials should be done following the closure instructions for 4640 series gauges. The case incorporates a silicon gasket in the lid to provide weather protection. The container closure is accomplished with hinges and "butterfly" hook-and-clasp latches constructed of heavy-duty, corrosion-protected steel. Closures are attached to the case walls with blind rivets installed into molded-in inserts. Integral security features are incorporated within the latch construction to permit the use of padlocks or security devices and tamper evident seals.

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Shielding

The case itself does not provide any shielding. The gauge has internal shielding that consists of a tungsten or lead shield around the source and a tungsten sliding block.

Packing material

The case is packed in accordance with the closure instructions for 4640 series gauges. The items packed in the case include a 4640 series gauge, standard block, air gap spacer, and chargers. Finally, the case is sealed with a security seal or a padlock.

This is to certify that the shipping container described above was tested in accordance with US Department of Transportation (USDOT) requirements and complies with the requirements and specifications set forth in the following sections in "Title 49 - Transportation" of the *Code of Federal Regulations* (2017):

- 49 CFR 173.410 - General design requirements
- 49 CFR 173.412 - Additional design requirements for Type A packages
- 49 CFR 173.461 - Demonstration of compliance with tests
- 49 CFR 173.465 - Type A packaging tests

Test Performed By:	<u>Britton Cole</u> Name	<u><i>Britton Cole</i></u> Signature	<u>10/18/23</u> Date:
Test Reviewed By:	<u><i>Robyn Myers</i></u> Name	<u><i>Robyn Myers</i></u> Signature	<u>11/2/23</u> Date:
Test Performed at:	<u>Troxler Electronic Labs, 3008 E. Cornwallis Road, RTP, NC</u>		

Troxler Electronic Laboratories, Inc.
Type A Packaging Tests per 49 CFR 173.465
Model 128501 Case and 4640 Series Gauges

General

The package was loaded with the gauge and all accessories in accordance with the closure instructions for 4640 series gauges. The package was then subjected to the performance tests of § 173.465 and evaluated against the successful test criteria specified in § 173.412(j).

Prior to all tests, a radiation survey was performed on the package, and a wipe test was performed to determine if the sealed source was compromised and leaking. Upon completion of the tests, the case was examined, a radiation survey was performed, the gauge was examined, and another leak test was performed.

Water spray test

The package was packed and closed per the closure instructions. The test package was sprayed with water on all four sides consecutively for a period of one hour. The simulated rainfall was measured using four cylinders surrounding the test package. The average rate of simulated rainfall was 4.75 in. per hour.

Results and damage noted

The water spray had no impact on the case. There was no water found inside the case. There was no damage to the case. There was no loss or dispersal of the radioactive contents, nor was there any significant increase in the radiation levels recorded at the external surfaces for the condition before the test.

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Free drop test

The package was loaded and closed per the closure instructions. The test package was lifted to a height of at least 4 ft. and then dropped onto an unyielding concrete floor. The case was dropped on each of the six sides of the case, and then it was dropped on the weakest corner of the case.

Results and damage noted

The case protected the radioactive material. Minor scuffing on the exterior of the case where it impacted the concrete floor was observed. There was some damage to the interior of the case (cracking of the interior walls) in the cavities that hold components other than the radioactive material. There was no loss or dispersal of the radioactive contents, nor was there any significant increase in the radiation levels recorded at the external surfaces for the condition before the test.

Test Performed By:	<u>Britton Cole</u>	<u><i>Britton Cole</i></u>	<u>10/18/23</u>
	Name	Signature	Date:
Test Reviewed By:	<u><i>Rebyn Myers</i></u>	<u><i>Rebyn Myers</i></u>	<u>11/2/23</u>
	Name	Signature	Date:
Test Performed at:	<u>Troxler Electronic Labs, 3008 E. Cornwallis Road, RTP, NC</u>		

Troxler Electronic Laboratories, Inc.
Type A Packaging Tests per 49 CFR 173.465
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Stacking test

The package was loaded and closed per the closure instructions. The stacking weight was calculated as the higher of five times the loaded weight of the package or the "footprint" of the gauge in square inches multiplied by 1.9. An empty case was placed on top of the case, and then the case was filled with weights to a final weight of 774.7 lb. The package was subjected to the load for at least twenty-four hours.

Results and damage noted

There was no loss or dispersal of the radioactive contents, nor was there any significant increase in the radiation levels recorded at the external surfaces for the condition before the test.

	<u>Britton Cole</u>	<u><i>Britton Cole</i></u>	<u>10/18/23</u>
	Name	Signature	Date:
Test Performed By:			
	<u>Robyn Myers</u>	<u><i>Robyn Myers</i></u>	<u>11/2/23</u>
	Name	Signature	Date:
Test Reviewed By:			
Test Performed at:	<u>Troxler Electronic Labs, 3008 E. Cornwallis Road, RTP, NC</u>		

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Penetration test

The package was loaded and closed per the closure instructions, then placed on an unyielding horizontal surface (i.e., a concrete floor). A test bar with a 1.25 in. diameter and a hemispherical end and a mass of 13.9 lb. (6 kg) was raised to a height of 3.3 ft. (1 m) above the top surface of the shipping case. The bar was allowed to free fall so that the hemispherical end struck the center of the lid face. Three drops were performed on the face most likely to impact the radioactive material.

Results and damage noted

The case protected the radioactive material. The impact of the bar created a small mark at the impact site, but it did not penetrate the case. There was no loss or dispersal of the radioactive contents, nor was there any significant increase in the radiation levels recorded at the external surfaces for the condition before the test.

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Conclusion

The packaging protects the contents under conditions incidental to transportation. There was no loss or dispersal of the radioactive contents, nor was there any significant increase in the radiation levels recorded at the external surfaces for the condition before the test.

Troxler Electronic Laboratories, Inc.
Package Closure Instructions
Model 128501 Cases and 4640 Series Gauges

49 CFR 178.2 - Applicability and responsibility (c) requires that closure instructions be provided "to effectively assemble and close the packaging for the purpose of preventing leakage in transportation. Closure instructions must provide for a consistent and repeatable means of closure that is sufficient to ensure the packaging is closed in the same manner as it was tested."

Troxler has prepared the following closure instructions in accordance with this guidance.

1. Visually inspect the transport case and its contents. Per § 173.461, look for divergence from the specifications or drawings, defects in construction, corrosion or other deterioration, and/or distortion of features. The package and its contents must be evaluated against the guidance of 49 CFR 173.475 - Quality control requirements prior to each shipment of Class 7 (radioactive) materials. (Please see the information regarding this evaluation at the end of the closure instructions.)
2. Lock the source rod in the SAFE position by squeezing the trigger on the handle and lifting the gauge until the source rod locks in the top position.
3. Install the gauge handle padlock through the hole in the handle and close the padlock.
4. Load the following items into the case in any order:
 - a. 4640 series gauge—Place the gauge in the case with the gauge body straight down with handle up.
 - b. Standard Block—Place the standard block in front of the gauge length wise with handle up.
 - c. Air Gap Spacer—Place the air gap spacer behind the gauge length wise
 - d. AC Charger—Place the AC charger to the left of the Standard Block.
 - e. Car Charger—Place to the right of the gauge.
5. Once all the items in the package are loaded, close the case lid.
6. To secure the lid, Close lid, push all 5 latches down on at a time.
7. Secure the gauge case with a padlock or a security seal.

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Model 128501 case and Model 4640 gauge



- (a) Model 4640 gauge
- (b) Standard Block
- (c) Air Gap Spacer
- (d) AC Charger
- (e) Car Charger

Figure 1. Exploded view items



- (a) Model 4640 gauge
- (b) Standard Block
- (c) Air Gap Spacer
- (d) AC Charger
- (e) Car Charger

Figure 2. Fully loaded case (open)

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§ 173.475

Before each shipment of any Class 7 (radioactive) materials package, the offeror must ensure, by examination or appropriate tests, that the requirements below are met.

Requirement	Action Required
(a) The packaging is proper for the contents to be shipped;	Evaluate the radioactive material being shipped in the package.
(b) The packaging is in unimpaired physical condition, except for superficial marks;	Evaluate the packaging.
(c) Each closure device of the packaging, including any required gasket, is properly installed, secured, and free of defects;	Ensure that each closure device is properly installed, secured, and free of defects.
(d) For fissile material, each moderator and neutron absorber, if required, is present and in proper condition;	*
(e) Each special instruction for filling, closing, and preparation of the packaging for shipment has been followed;	*
(f) Each closure, valve, or other opening of the containment system through which the radioactive content might escape is properly closed and sealed;	*
(g) Each packaging containing liquid in excess of an A ₂ quantity and intended for air shipment has been tested to show that it will not leak under an ambient atmospheric pressure of not more than 25 kPa, absolute (3.6 psia). The test must be conducted on the entire containment system, or on any receptacle or vessel within the containment system, to determine compliance with this requirement;	*
(h) The internal pressure of the containment system will not exceed the design pressure during transportation; and	*
(i) External radiation and contamination levels are within the allowable limits specified in this subchapter.	Evaluate external radiation and contamination levels.

** No action is required for this package.*