

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-636-D-101-G

DATE: June 20, 1994

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DEVICE TYPE: Static Charge Neutralizer

MODELS: 3012, 3013, 3054, 3077, 3078

MANUFACTURER/DISTRIBUTOR:

TSI, Incorporated
500 Cardigan Road
P.O. Box 64394
St. Paul, MN 55164

SEALED SOURCE MODEL DESIGNATION:

DuPont Merck: NER-8295, NER-8285, NER-8275; 3M Model 3B4G

ISOTOPE:

MAXIMUM ACTIVITY:

Krypton-85

1 mCi/37 MBq (Model 3013, 3078)
2 mCi/74 MBq (Model 3012, 3077)
10 mCi/370 MBq (Model 3054)

LEAK TEST FREQUENCY: Not required

PRINCIPLE USE: (0) Ion Generators, Static Eliminators

CUSTOM DEVICE: _____ YES _____ X _____ NO

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DESCRIPTION:

The TSI, Incorporated, Models 3012, 3013, 3054, 3077, 3078, are designed to neutralize electrostatic charges on airborne particles or to charge particles as they pass through the device. These models are usually plumbed into an aerosol sampling system.

Models 3012, 3013, 3054, 3077, and 3078 are similar in design. The krypton gas is contained in a stainless steel tube. This tube is inserted into source holders, one on each end, and expoxied in place. Models 3054, 3012, and 3013 have additional set screws to hold the tube in place. The source holders are bolted (Models 3012, 3013, 3077, 3078) or riveted (Model 3054) and expoxied to the inside of the outer cylindrical housing. For Models 3012, and 3013, the outer housing is constructed of aluminum. The outer housing is constructed of stainless steel for Models 3054, 3077, and 3078.

The Model dimensions are given in Table I, below:

TABLE I. Model Dimensions		
<u>Model</u>	<u>Length (in/cm)</u>	<u>Diameter (in/cm)</u>
3012	17.8/45.2	3.0/7.6
3013	17.8/45.2	3.0/7.6
3054	20.0/50.8	3.6/9.1
3077	6.1/15.5	1.5/3.8
3078	6.1/15.5	1.5/3.8

Models 3013, and 3078 contain 1 millicurie of krypton-85. Models 3012, and 3077 contain 2 millicuries of krypton-85. Model 3054 contains 10 millicuries of krypton-85.

LABELING:

The devices are labeled in accordance with Section 20.203, 10 CFR Part 20 and the requirements of Section 32.51, 10 CFR Part 32.

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DIAGRAM:

See attachments 1-3.

CONDITIONS OF NORMAL USE:

The devices can be used up to a maximum temperature of 150°F (66°C) and are usually plumbed into an aerosol sampling system.

PROTOTYPE TESTING:

Prototype testing for TSI, Incorporated Models 3012, 3054, 3077 electrostatic charge neutralizers were deemed acceptable by the NRC for licensing purposes on December 30, 1976.

The manufacturer submitted data to show that Models 3012, 3054, and 3077 have been used in the field since October 1, 1986, with no associated health and safety problems.

The sealed sources have achieved an ANSI N542 - 1977 classification of 77C32131.

EXTERNAL RADIATION LEVELS:

Model 3012: The manufacturer reports that measurements were made of the radiation levels for Model 3012. The measurements were made using Harshaw TLD-100, crystal dosimeters. They were exposed for 24 hours with the following results:

- 2.3 mR/hr (23 μ Sv/hr) - surface of the outer aluminum tube
- 2.6 mR/hr (26 μ Sv/hr) - end of the inlet and exit tubes

Model 3054: The manufacturer reports that radiation measurements were made of the Model 3054 aerosol neutralizer using TLD dosimeters where Harshaw TLD-100 crystals were used, and Model 2592 Nuclear Chicago Cutie-Pie. Maximum radiation dose rates were found on the surface of the device near the krypton source position and was found to be 13.1 mR/hr (131 μ Sv/hr).

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EXTERNAL RADIATION LEVELS (continued):

Model 3077: Surface measurements on the side closest to the source and at the midline of the source indicated 1.1 mR/hr (11 μ Sv/hr). Measurement made six inches from the center of the source indicated 0.14 mR/hr (1.4 μ Sv/hr).

Models 3013, and 3078 would be expected to have lower external radiation levels due to lower activities than Models 3012, and 3078, respectfully.

QUALITY ASSURANCE AND CONTROL:

The QA program was deemed acceptable by the NRC for licensing purposes on December 30, 1976.

The manufacturing process for each model consists of fabricating or purchasing the component parts and sending these parts to the radioactive source manufacturer. The source manufacturer fabricates the source and completes the assembly of the neutralizer.

The assembled product is then returned to TSI where a protective wrapper is applied, as well as, some additional labels.

Both source manufacturers 3M and DuPont-Merck have acceptable QA/QC programs.

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The devices shall be distributed to persons that are generally licensed by the NRC or an Agreement State.
- The device shall be installed and initially tested for proper labeling, and external radiation levels and leak tested by persons specifically licensed by the NRC or an Agreement State.
- Handling, storage, use, transfer, disposal: To be done in accordance with 10 CFR 31.5 and Section 32.51.

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LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (Continued):

- This registration and the information contained within the references shall not be changed without the written consent of the NRC.

SAFETY ANALYSIS SUMMARY:

Based on our review of the information and test data cited below, we conclude that the TSI, Incorporated's Models 3012, 3013, 3054, 3077, and 3078 have sufficient information to provide reasonable assurance that:

- The device can be safely operated by persons not having training in radiological protection.
- Under accident conditions (such as fire and explosion) associated with handling, storage and use of the device, it is unlikely that any persons would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified below.

Part Of Body

Rem (mSv)

Whole body; head and trunk
active blood-forming organs;
gonads; or lens of eye

15 (150)

Hands and forearms; feet and
ankles; localized areas of skin
averaged over areas no larger
than 1 square centimeter

200 (2000)

Other organs

50 (500)

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SAFETY ANALYSIS SUMMARY (CONT.):

- Under ordinary conditions of handling, storage, and use of the device, the byproduct material contained in the device will not be released or inadvertently removed from the device, and it is unlikely that any person will receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in the table in Section 20.101(a), 10 CFR 20.

Furthermore, we conclude that these devices would be expected to maintain their containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:

The following supporting documents for Models 3012, 3013, 3054, 3077, and 3078 are hereby incorporated by reference and are made a part of this registry document:

- TSI's application dated August 5, 1991, letters dated November 22, 1991, October 25, 1991, and November 8, 1993, with enclosures thereto.

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: June 20, 1994

Reviewer:

Thomas W. Rich
Thomas W. Rich

Date: June 20, 1994

Concurrence:

Douglas A. Broadus
Douglas A. Broadus

ATTACHMENT 1

Model 3077

ATTACHMENT 2



ATTACHMENT 3

