Grinnell®
FIRE PROTECTION SYSTEMS COMPANY
835 Sharon Drive
Westlake, Ohio 44145
1-440-871-9900

A tyco INTERNATIONAL LTD. COMPANY

QUALITY SYSTEM MANUAL

[x] Controlled Copy # 001

Assigned to: United States Nuclear Regulatory Commission

[ ] Uncontrolled Copy

Mark Vodak
General Manager

Al Hilt
Director of Operations

Issue 3 dated June 29,1998

Grinnell®

FIRE PROTECTION SYSTEMS COMPANY

QUALITY POLICY

The Quality of the products and services that Grinnell Fire Protection Systems provides is of paramount importance to the continuing prosperity of the Company.

Grinnell recognizes that to maintain its position as market and technology leaders, an effective and dynamic Quality Management System is essential. This policy is intended to benefit both the Customer and Company through increased customer satisfaction, leading to growth in existing markets and investments in new market areas. Of vital importance is our commitment to supply Quality products through stringent process control methods and to deliver proactive and timely service to our Customers.

The Quality Management System is designed to operate in accordance with the requirements of ISO 9001 and other appropriate standards. The system is not limited by those standards and in addition, through programs of continuous improvement, the system is continually reviewed and improved.

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SCOPE of REGISTRATION

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Through the implementation of this quality system and management's commitment to continuous improvement, the quality policy is understood, implemented and maintained at all levels of the organization.

1.2 The organization is designed to provide individuals with the freedom and authority to initiate action to prevent the occurrence of non-conforming products and services. An organization chart is provided in Appendix A of this manual.

1.3 A Management Review of the quality system is performed on a pre-determined basis in order to ensure its continuing suitability and effectiveness in meeting the objectives of the quality policy. The foundation for this review process is the ***Management System Audit Procedure.***

1.4 Departmental Operating Procedures define the structure of the departments and identify the resources required to meet the objectives of the quality policy and the individuals who are responsible and authorized to manage, perform and verify work affecting quality.

Quality Assurance DOP
Assembly DOP
Custom Engineered Systems DOP
Product Management DOP
Customer Service DOP
Test DOP
Materials DOP
Marketing and Communications DOP
Research and Development DOP

1.4 The Director of Operations is the management representative with executive responsibility appointed to establish, implement and maintain the quality system. The representative is responsible for reporting on the performance of the quality system to the executive management. 1

Section 2 Quality System

2.1 Grinnell has established and maintains a documented quality system through the implementation of procedures as defined in this manual. This system ensures product conformance to customer requirements.

2.2 The procedures required to effectively implement the quality system are identified in this Quality System Manual. In addition to these procedures, Local Work Instructions have been identified that define how an activity is performed.

2.3 The planning for this quality system was based upon the elements of the ISO 9001 (1994) standard. This Quality System Manual defines and documents the requirements for quality and outlines the procedures used to assure that activities affecting the quality of product and services provided are controlled.

2.4 Quality plans, as defined in the ***Quality Planning Procedure***, will be raised where the executive management team of Grinnell Fire Protection Systems requires specific planning above and beyond standard company processes and/or procedures. Such needs could arise where special contract conditions dictate, through new product introduction or if process warrants particular attention

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3.3 The order amendment process is clearly defined, and Records of contract reviews are maintained.

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4.2 This procedure directs the planning process which identifies the organizational and technical interfaces required to carry out the design and development process. The details for design review, verification and validation are specified during the planning process.

4.3 All design changes are documented and approved by authorized personnel prior to release.

Section 5 Document and Data Control

5.1 Grinnell has established and maintains a ***Document and Data Control Procedure*** that identifies the documents that require control and the functional groups within the organization responsible for control, approval of originals and changes, distribution, retention and disposition.

5.2 The procedure defines the method established to ensure appropriate issue of documents are available at all times. Invalid and obsolete documents are removed from points of use.

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5.4 The ***Authorization to Deviate from Specification Procedure*** defines the process used to temporarily deviate from specification.

Section 6 Purchasing

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6.2 This quality procedure defines the extent of control Grinnell exercises over suppliers and the evaluation process used to determine the capability of the supplier to provide consistent quality parts.

6.3 The established procedure ensures that the purchasing documentation clearly defines the requirements. Special

requirements specified during the contract review process are clearly defined and communicated to suppliers.

6.4 In cases where a customer specifies that witness testing shall be carried out on either Grinnell or Customer premises, Grinnell shall ensure that all records are kept in line with the project and customer requirements

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7.1 The control of customer-supplied product is procedurally described in the ***Material Control Procedure***. The procedure defines the process used to identify customer product upon receipt.

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9.2 Local Work Instructions are used to ensure that variables within the process are under control. Workmanship standards are used as a tool to ensure product consistency.

9.3 Grinnell provides qualified personnel and continuous monitoring of process parameters for processes that cannot be verified through subsequent testing or inspection.

9.4 The control of Electro Static Discharge has been identified as a critical requirement within our facility. The ***ESD Control*** procedure identifies the methods, equipment and training required to assure dependable and reliable product.

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10.1 Grinnell has established and maintains Local Work Instructions that define the processes used to verify that specified requirements for products are met.

10.2 Acceptance criteria has been established and receiving inspection is performed according to Local Work Instructions. Incoming product is not used until applicable inspection has been performed.

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11.2 All calibrated equipment is traceable to The National Institute of Standards and Technology. Certification procedures conform to American National Standards specifications (ANSI/NCSL-Z540-1).

11.3 The measurements to be made and the accuracy of the equipment is identified and appropriate equipment is provided. Equipment is identified and records of calibration are maintained.

11.4 The corrective and preventive action process is used to assess and document previous inspections and tests when equipment is found to be out of calibration.

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14.2 The results of the corrective and preventive action process are reviewed by management as a means of evaluating the effectiveness of the quality system.

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15.1 The systems used to control handling, storage, packing, preservation and delivery of product are procedurally described in the ***Material Control Procedure***.

15.2 The procedure describes the methods employed to provide proper handling, packaging and storage techniques to prevent damage or deterioration to the product.

15.3 A cycle count system is used to assess the inventory at regular intervals to detect deterioration.

Section 16 Control of Quality Records

16.1 The system employed to control quality records is described in the ***Document and Data Control Procedure***.

16.2 Quality records are identified in procedures and local work instructions. Provisions are made that clearly identify the department that is responsible for the collection and maintenance of the records, the retention period and the final disposition of the record.

16.3 Quality records are stored in a manner to prevent damage or deterioration. Procedures document the requirements for maintaining quality records stored in electronic media.

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17.1 The ***Management System Audit Procedure*** defines the method used to verify the effectiveness of the quality system. The audits are performed by trained personnel independent of the area under audit. The corrective and preventive action activites identified during the audit process are evaluated for effectiveness during follow-up audits.

Section 18 Training

18.1 Grinnell's ***Training Procedure*** describes the system that identifies the training needs that provide the resources required to ensure

the effective implementation of the quality system. Training records are maintained.

18.2 Job descriptions identify the educational qualifications and related work experience personnel require to perform the assigned duties.

Section 19 Servicing

19.1 Phone support and training services are provided by Grinnell Fire Protection Systems Co. to assist our customers during product installation and on-going maintenance.

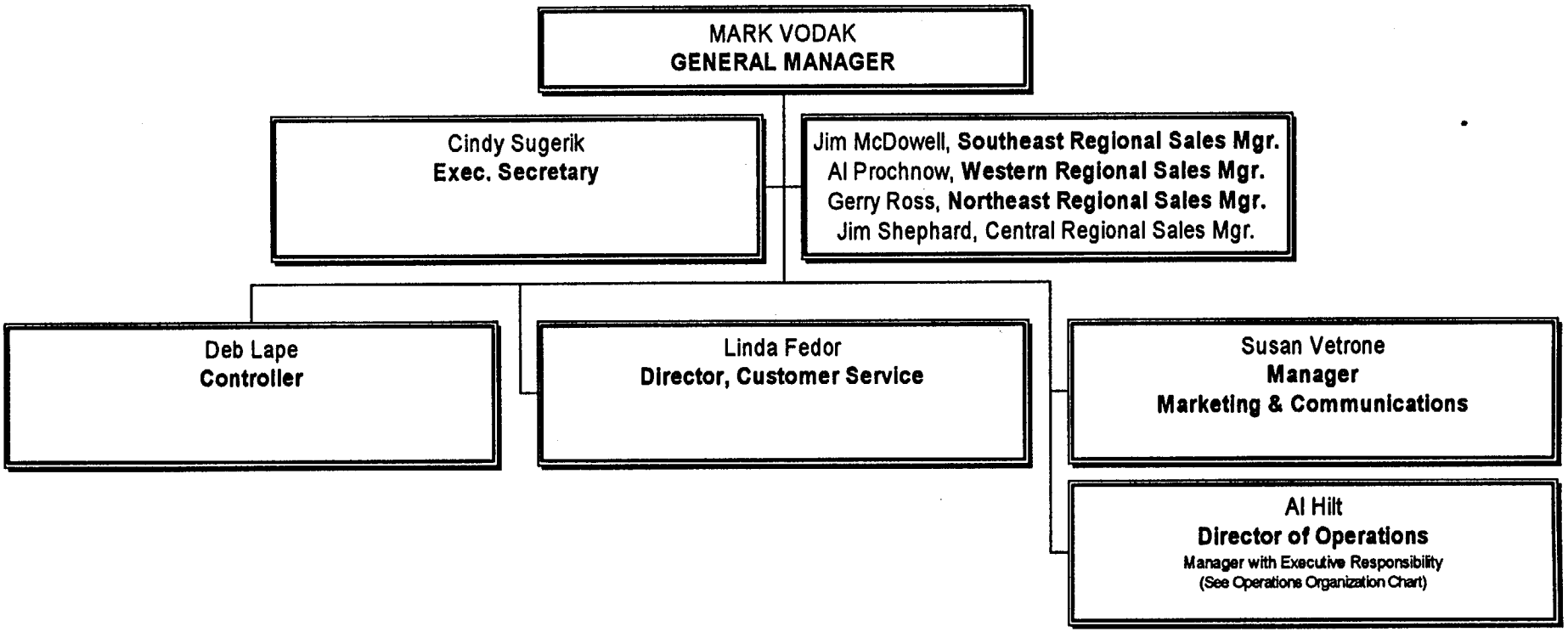
19.2 Warranty service for products are controlled through local work instructions in the Test Department.

Section 20 Statistical Techniques

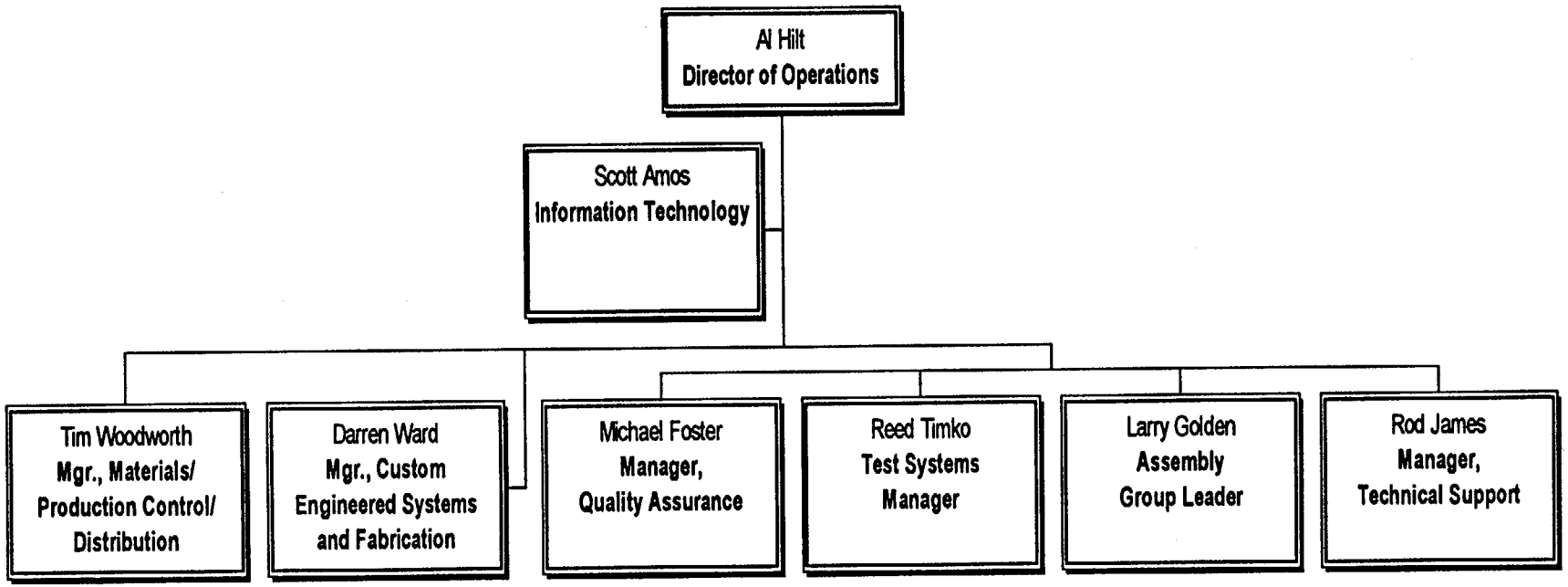
20.1 Statistical techniques are employed by the quality department when and where appropriate. The use of statistical techniques have been identified in various processes and their use is defined in local work instructions.

20.2 Statistical techniques are use to quantify the results for the evaluation of the effectiveness of the quality system during the management review process.

Grinnell Fire Protection Systems - Westlake Operations



Grinnell Fire Protection Systems - Operations



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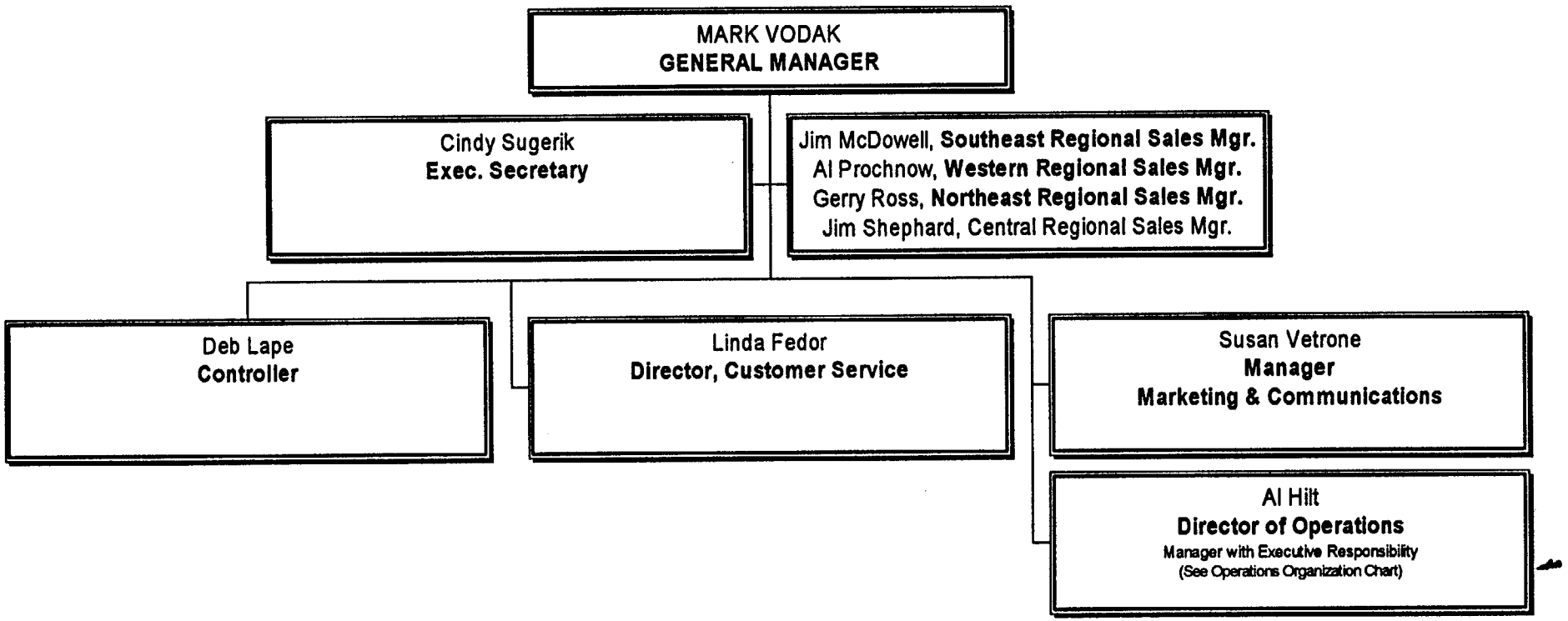

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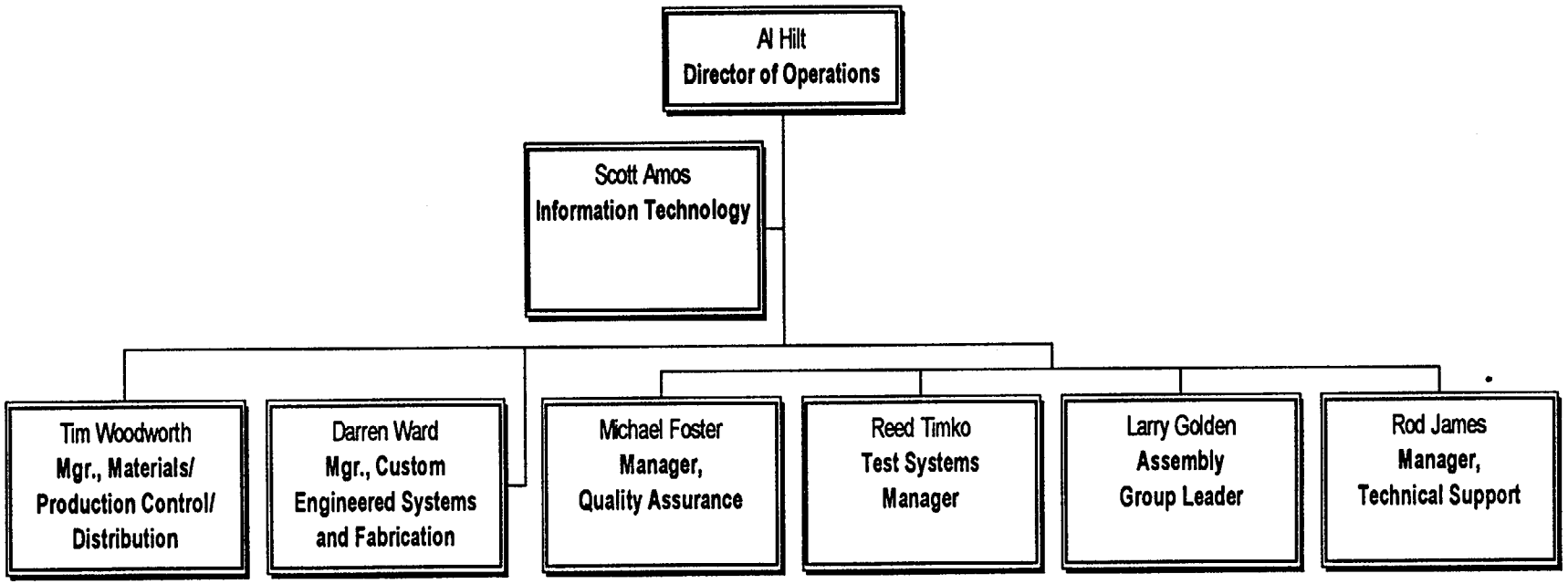

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-0776-D-101-E DATE: September 16, 1994 PAGE 1 OF 2

DEVICE TYPE: Smoke Detector

MODEL: MF Series, OIB (P/N PU 90-21000-1 and P/N PU 90-41000-1), NID-58, NID-68 AS Series

DISTRIBUTOR: Thorn Automated Systems, Inc.
835 Sharon Drive
Westlake, OH 44145

MANUFACTURER: Thorn Security Limited
Technology Centre
The Summit
Hanworth Road
Sunbury-on-Thames
Middlesex
TW16 5DB

Nittan Company, LTD.
11-6, 1-Chome
Hatagaya
Shibuya-ku
Tokyo 151, Japan

SEALED SOURCE MODEL DESIGNATION: Amersham: AMM1001H, AMM1001

ISOTOPE:	MAXIMUM ACTIVITY:
Americium-241	1.0 microcurie (37 kBq)

LEAK TEST FREQUENCY: Not required

PRINCIPAL USE: (P) Ion Generator, Smoke Detectors

CUSTOM DEVICE: _____ YES __X__ NO

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: NR-0776-D-101-E DATE: September 16, 1994 PAGE 2 OF 2

DEVICE TYPE: Smoke Detector

DESCRIPTION:

The MF Series consists of models MF312, MF412, and MF512 and is intended for commercial use. All three use the same mechanical construction, and different performance characteristics are obtained by variations on the electrical circuit. The NID-58 is a battery-operated, dual-chamber detector employing a single sealed source. The sensitivity may be adjusted through use of a sensitivity set screw. The OIB is a smaller unit of the NID-58 designed for use in computers, airplanes, etc. The OIB has two alternative numbers (PU90-21000-1 and PU90-41000-1) depending on the vendor. The NID-68AS series are factory adjusted and sealed units that transmit a signal, proprtional to the smoke density, to a control unit. The control unit employs software and user set limits to determine when an alarm threshold has been exceeded.

REFERENCES:

The following supporting documents for the Models MF Series, OIB (P/N PU 90-2000-1 and P/N PU 90-41000-1), NID-58, and NID-68 AS Series smoke detectors are hereby incorporated by reference and are made a part of this registry document.

- Thorn Security, Ltd.'s letters dated October 25, 1989, May 31, 1990 July 20, 1990, August 26, 1993, and February 10, 1994, with enclosures thereto.
- Thorn Automated Systems' letters dated March 14, 1990, August 9, 1990, October 10, 1991, April 25, 1994, and August 18, 1994, with enclosures thereto.
- Autocall, Inc./Nittan Corp.'s letter dated November 15, 1989, with enclosures thereto.
- Affidavit dated March 13, 1992.

ISSUING AGENCY:

U.S. Nuclear Regulatory Commission

Date: September 16, 1994 Reviewer: _____
Douglas A. Broaddus

Date: September 16, 1994 Concurrence: _____
Steven L. Baggett

[redacted]

12/3

ISSOD

Log Dec. 89
Remitter
Check No. MD 101 0001370156
Amount $1,600
Fee Category 9A APP
Type of Fee
Date Check Rec'd 12-15-89
Date Completed
By A Cimbelly

THORN SECURITY

THORN SECURITY Limited
Security House
Twickenham Road
Feltham
Middlesex TW13 6SQ
England
Telephone 01-755 4333
Telex 8814916
Fax 01-755 2831

Mr. Stephen Baggett
NRC Office of Nuclear Materials
Safety and Safeguards
WASHINGTON DC
20555 USA

Date: 25thOct'89

Copy: L.Kaiser
W.Vodak
W.Fawcett
R.Barrett
cfi: B.E.H.Laluvein

Subject: Safety Evaluation and Reistration of THORN SECURITY MF312 Ion Chamber Smoke Detector

Dear Mr. Baggett,

We hereby apply for Safety Evaluation and Registration of our MF312 Ion Chamber Detector. Enclosed are the Application Fee of $1600, two sets of the documentation required and two Dummy Detectors from which one cover has been removed to facilitate your easy inspection.

If you need any further information or clarification, please do not hesitate to contact either the writer of this letter or our Mr. R. Barrett.

It is worth mentioning that when the registration of the design is complete, our colleagues at THORN AUTOMATED SYSTEMS Inc. of Westlake Ohio, will be the US distributor of the devices. They will, of course, be applying for a License to carry out this function in the near future.

We are looking forward to a successful outcome to this application. Could you possibly indicate the likely timescale to achieve registration, assuming no technical difficulties. Perhaps it would also be useful for us to know the average time taken for simple applications such as ours.

Very best regards,

Yours sincerely,

Peter Carlton

Peter Carlton
PDS Manager

ATTACHMENT A1-1

A THORN EMI Company
Registered in England
No. 725346
Registered Office
Security House
Twickenham Road
Feltham
Middlesex

BS 5445 : Part 7 : 1984
EN 54 : Part 7
UDC 614.842.435:654.924.56:620.1

Components of automatic fire detection systems

Part 7. Specification for point-type smoke detectors using scattered light, transmitted light or ionization

Organes constitutifs des systèmes de détection automatique d'incendie
Partie 7. Détecteurs ponctuels de fumée, fonctionnant suivant le principe de la diffusion de la lumière, de la transmission de la lumière et de l'ionisation

Bestandteile automatischer Brandmeldeanlagen
Teil 7. Punktförmige Rauchmelder, nach dem Streulicht-, Durchlicht-, oder Ionisationsprinzip

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 54
Part 7
July 1982

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Key words; fire fighting, fire detection systems, smoke, automatic control, specifications, tests, marking, light diffusion, light transmission, ionization, performance tests, reproducibility, vibration tests, impact tests, environmental tests, corrosion tests, voltage fluctuations, insulation resistance, dielectric strength tests, test equipment

English version

Components of automatic fire detection systems

Part 7. Point type smoke detectors; Detectors using scattered light, transmitted light or ionization

Organes constitutifs des systèmes de détection automatique d'incendie.
Partie 7. Détecteurs ponctuels de fumée; Détecteurs fonctionnant suivant le principe de la diffusion de la lumière, de la transmission de la lumière et de l'ionisation

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This European Standard was accepted by CEN on 1982-07-30. CEN members are bound to comply with the requirements of CEN Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue Bréderode 2, B-1000 Brussels

Components of automatic fire detection systems

Part 7. Point type smoke detectors; detectors using scattered light, transmitted light or ionization

1. Object and field of application

This European Standard specifies requirements, test methods and performance criteria for point-type, re-settable smoke detectors that operate using scattered light, transmitted light, or ionization.

For the testing of other types of smoke detectors, or smoke detectors working on different principles, this standard should only be used for guidance. Smoke detectors with special characteristics and developed for specific risks are not covered by this standard.

NOTE. Certain types of detector contain radioactive materials. The national requirements differ from country to country and are not specified in this standard.

2. Methods of test and test schedules

2.1 General requirements for testing

The detectors shall be tested according to the schedule in annex A.

Where applicable in each test, the detector(s) under test shall be connected to supply and indicating equipment in accordance with the data supplied by the manufacturer. If the supply and indicating equipment affects the response behaviour of a detector a special note shall be provided in the test report.

If a detector permits adjustment of the threshold value, it shall meet the requirements of the standard at the extremes of adjustment.

If the requirements of any one of the clauses in this Part are not met, then the type of detector does not comply with this Part 7 of the standard EN 54.

NOTE 1. Smoke detectors are subjected to basic tests and fire sensitivity tests. In the basic tests (clause 5 to 20) the detectors are tested in various ways to determine whether they are basically capable of withstanding certain ambient conditions that may occur in practice, so as to be sufficiently certain that the detector will remain functional for a sufficiently long period of practical use, or at least for a period between two services or inspections of the installed fire detection system. Furthermore, the basic tests verify the constancy of the response threshold of an individual detector and the similarity of response threshold of detectors relative to one another. The behaviour of the detectors in the case of fire is not examined in the basic tests.

NOTE 2. In clause 21, the fire sensitivity tests according to EN 54-9, the detectors are subjected to various real test fires in a fire test room. In this way, the response behaviour of the detectors to real fires is verified and the sensitivity of the detectors to various defined fires is determined.

2.2 General tolerance for methods of test

Where tolerances are not specified in the methods of test given in the annexes, a general tolerance of ± 5 % shall be assumed.

3. General requirements

3.1 Data

The manufacturer shall ensure that any type of detector purporting to comply with this Part of EN 54 is capable of passing all the tests and other requirements given herein. Detectors which are intended for marketing as separate units for installation in different systems shall be marked with sufficient operational data to ensure their performance in accordance with this standard, or alternatively such data shall be provided separately. The manufacturer shall specify the operating principle of the detector.

3.2 Marking

Each detector purporting to comply with the requirements of this Part of EN 54 shall be marked with:

(a) the number of this standard (i.e. EN 54-7);

(b) the name or trademark of the organization accepting liability for compliance of the detector with this Part of EN 54 (this organization may be the manufacturer or the supplier of the detector);

NOTE. In some countries it is required that certification of compliance with this standard is carried out by an approved test house. Such requirements will normally be given in a national particularity to this standard.

(c) the type number of the detector.

3.3 Individual indication of operation

Each smoke detector shall be provided with an indicating lamp, or equivalent visual indication, by which the individual detector releasing an alarm may be identified.

4. Response threshold value

Measurement of response threshold value, required for the tests specified in clauses 5 to 17 and 20, shall be carried out in the manner described in annex B.

NOTE. In this Part of EN 54, m is the response threshold value for scattered light smoke detectors and transmitted light smoke detectors, and y is the response threshold value for ionization smoke detectors. (See annex B.)

5. Switch-on

The detector shall be tested in the manner described in annex C.

The detector shall be deemed to comply with the requirements of this clause if the ratio of the response threshold values $y_{max} : y_{min}$ or $m_{max} : m_{min}$ is not greater than 1,6, and the lower response threshold value y_{min} is not less than 0,2 or m_{min} is not less than 0,05 dB/m and if the detector emits neither a fault signal nor an alarm signal during the test.

6. Repeatability

The detector shall be tested in the manner described in annex D.

The detector shall be deemed to comply with the requirements of this clause if the ratio of the response threshold values $y_{max} : y_{min}$ or $m_{max} : m_{min}$ is not greater than 1,6 and the lower response threshold value y_{min} is not less than 0,2 or m_{min} is not less than 0,05 dB/m

7. Directional dependence

The detector shall be tested in the manner described in annex E.

The detector shall be deemed to comply with the requirements of this clause if the ratio of the response threshold values $y_{max} : y_{min}$ or $m_{max} : m_{min}$ is not greater than 1,6, and the lower response threshold value y_{min} is not less than 0,2 or m_{min} is not less than 0,05 dB/m

8. Reproducibility

The detectors shall be tested in the manner described in annex F.

The detector shall be deemed to comply with the requirements of this clause if no breakdown or flashover is observed during the test.

20. Low ambient temperature

The detector shall be tested in the manner described in annex S.

The detector shall be deemed to comply with the requirements of this clause if

(a) during the fall in temperature and during the stabilization period no fault signal or alarm signal is emitted;

(b) the ratio of the response threshold values $y_{max} : y_{min}$ or $m_{max} : m_{min}$ is not greater than 1,6.

21. Fire sensitivity

The four detectors shall be tested in the manner described in EN 54-9 using test fires TF 2, TF 3, TF 4 and TF 5.

The detectors shall be deemed to comply with the requirements of this clause of EN 54-7 if all the detectors detect the test fires TF 2, TF 3, TF 4 and TF 5 and can be classified as being class A, B or C.

Annex B

Measurement of the response threshold values in the wind tunnel

B.1 Test method

The detector provided for the test shall be installed in the wind tunnel (B.2) in its normal operating position with the fastenings provided for this purpose. The detector shall be connected to its control and indicating equipment for 15 min to 20 min before commencing measurement.

The air velocity in the wind tunnel in the proximity of the detector shall be 0,2 ± 0,04 m/s for all tests unless a different value is expressly indicated, e.g. the test according to clause 10.

The air temperature in the wind tunnel shall be 23 ± 5 °C, unless a different value is expressly indicated, e.g. the test according to clause 11.

In all the measurements of the response thresholds of a particular type detector, other than those of annex J, the air temperature in the wind tunnel shall not vary by more than 5 °C, unless a different value is expressly indicated, e.g. the test according to clause 11.

In all tests the supply voltage to the detectors shall be between 99 % and 101 % of the nominal supply voltage, unless a different value is expressly indicated, e.g. the test according to clause 9.

Before commencing each measurement the wind tunnel and the detector to be tested shall be free from aerosol.

All aerosol density measurements shall be carried out in the proximity of the detector.

A test aerosol (see B.3) shall be fed into the wind tunnel so that:

$$\frac{\Delta m}{\Delta t} < 0{,}2 \quad \frac{\text{dB/m}}{\text{min}} \quad \text{(for optical smoke detectors)}$$

$$\frac{\Delta y}{\Delta t} < 0{,}15\ \text{min}^{-1} \quad \text{(for ionization smoke detectors)}$$

See B.4 for the definitions of m and y.

The initially selected rate of increase in aerosol density shall be similar for all measurements in the wind tunnel.

At the moment of response of the detector the value m shall be recorded for optical detectors or y for ionization detectors.

B.2 Wind tunnel

A closed circuit wind tunnel capable of air velocities between 0,1 m/s and 1 m/s shall be used for the test. Means shall be provided for the introduction of the test aerosol such that, in the measuring section, a homogeneous dispersion of aerosol density is obtained over the cross-section.

The air temperature in the wind tunnel shall be capable of being raised from 20 °C to 50 °C at a rate of < 1 °C/min.

A plan of the measuring section, and the positions of the measuring instruments and smoke detectors being tested are shown in figure 1.

B.3 Test aerosol

A polydispersive aerosol shall be used as the test aerosol. The maximum of its particle size distribution shall be between 0,5 µm and 1 µm. The refractive index of the aerosol particles should be approximately 1,4.

The test aerosol shall be generated, reproducible and stable with regard to the following parameters:

- particle size distribution,
- optical constants of the particles,
- particle shape,
- particle structure.

The stability of the aerosol should be ensured. One possible method to ensure that the aerosol is stable is to measure the ratio $m : y$.

It is recommended that an aerosol generator producing a paraffin oil mist is used as the test aerosol (e.g. liquid paraffin which is used for pharmaceutical purposes).

B.4 Response threshold value, measuring instruments

B.4.1 *Optical method*

The response threshold value of optical smoke detectors is characterized by the absorbance index of the test aerosol measured at the moment of response.

The absorbance index is designated m and given in units of decibels per metre (dB/m). The defining equation

$$m = \frac{10}{d} \log_{10} \frac{P_o}{P}$$

applies for the absorbance index, where

- d = the optical measuring length in the test aerosol (measured in m);
- P_o = the radiated power received without the test aerosol;
- P = the radiated power received with the test aerosol.

The measuring instrument shall have the following properties:

(a) the length of the measuring zone in which the aerosol is measured shall be not more than 1,1 m; greater effective optical measuring lengths can be obtained by reflection of the measuring beam inside the measuring zone;

(b) the optical system shall be arranged so that any light scattered by more than 3° by the test aerosol is disregarded by the light detector;

(c) at least 50 % of the effective power of the light beam shall be within a wavelength range of from 800 nm to 950 nm, not more than 1 % of the effective radiated power shall be within a wavelength range below 800 nm and not more than 10 % of the effective radiated power shall be within a wavelength range above 1050 nm (the effective radiated power in each wavelength range is the product of the power emitted by the light source, the transmission level of the optical measuring path in clean air and the sensitivity of the indicator within this wavelength range);

(d) the measurements shall be carried out with a degree of accuracy such that, for all smoke densities between 0 dB/m and 2 dB/m, the error of measurement does not exceed 0,02 dB/m + 5 % of the smoke density indicated.

Before and after each test in which response threshold values are measured, the indication shown on the measuring instrument shall be compared with an indication in clean air. If there is a discrepancy of more than 0,02 dB/m between the two measured values of such a pair, the response threshold value measured shall be deemed invalid and the measurement shall be repeated.

8.4.2.3 *Technical data*

(a) *Radiation source:*

isotope	Am^{241}
activity	130 kBq (3,5 µCi) ± 5 %
average α energy	4,5 MeV ± 5 %

The radiation source is gripped by its holder in such a way that no open cut edges are accessible, and its open surface is protected by a noble metal layer so that no americium is accessible on the surface.

Form of radiation source:

circular disc
ϕ = 27 mm

(b) *Ionization chamber:*

The current-voltage characteristic of the chamber measured in aerosol free air at:

pressure	= 101,3 ± 1 kPa (760 mmHg)(1, 013 bar),
temperature	= 25 ± 2 °C,
relative humidity	= 55 ± 20 %,

should be as in figure 4. The chamber impedance (reciprocal of the slope of the current-voltage characteristic) should be $1,9 \times 10^{11}$ Ω ± 5 %.

The chamber is normally operated in the circuit of figure 5. The supply voltage should be such that the current in the measuring electrodes is 100 pA.

(c) *Current measuring amplifier:*

$R_i < 10^9$ Ω

(d) *Suction system:*

quantity of air required 30 l/min ± 10 %.

Annex C

Switch on test

The response threshold value of the detector shall be measured according to annex B. The detector shall remain connected to its supply and indicating equipment for 7 days without interruption. After this period the response threshold value shall be once more determined according to annex B.

The flow direction is arbitrary, but it shall be the same for both measurements.

The greater response threshold value is given the symbol y_{max} or m_{max}, the lesser value is given the symbol y_{min} or m_{min}.

Annex D

Repeatability test

The response threshold value of the detector shall be measured 6 times according to annex B.

The flow direction is arbitrary, but it shall be the same for all 6 measurements.

The maximum response threshold value is given the symbol y_{max} or m_{max}, the minimum value is given the symbol y_{min} or m_{min}.

Annex E

Test for directional dependence

The response threshold value of the detector shall be measured according to annex B. A total of 8 measurements shall be taken, the detector being rotated 45° about a vertical axis between each measurement, so that the measurements are taken for 8 different flow directions.

The detector faces facing the air flow for which the maximum and minimum response threshold values were measured, shall be marked accordingly. In the following tests the corresponding directions are called respectively 'most unfavourable' and 'most favourable' direction.

The maximum response threshold value is given the symbol y_{max} or m_{max}, the minimum value is given the symbol y_{min} or m_{min}.

Annex F

Reproducibility test

The response threshold values of the detectors shall be measured and recorded according to annex B for the most unfavourable flow direction.

The maximum response threshold value is given the symbol y_{max} or m_{max}, the minimum value is given the symbol y_{min} or m_{min}.

Annex G

Variations of supply voltage test

The response threshold value of the detector shall be measured twice according to annex B, for the most unfavourable flow direction, once at the upper limit and once at the lower limit of the nominal supply voltage range specified by the manufacturer. If no voltage range is given, the response threshold value shall be measured once at 85 % and once at 110 % of the nominal supply voltage.

The maximum response threshold value is given the symbol y_{max} or m_{max}, the minimum value is given the symbol y_{min} or m_{min}.

Annex H

Test for sensitivity to air movement

H.1 Response behaviour

The response threshold value of the detector shall be measured as in annex B for the most and least favourable flow directions. The response threshold values in these tests are $y_{(0,2)max}$ and $y_{(0,2)min}$ or $m_{(0,2)max}$ and $m_{(0,2)min}$. The tests shall be repeated using an air velocity in the proximity of the detector of 1 ± 0,2 m/s. The response threshold values in these tests are $y_{(1,0)max}$ and $y_{(1,0)min}$ or $m_{(1,0)max}$ and $m_{(1,0)min}$.

H.2 False alarm behaviour

The detector shall be placed in a suitable wind tunnel and subjected to an aerosol-free air flow at a velocity of v = 5 ± 0,5 m/s and then to a gust lasting 2 s at a velocity of 10 ± 1 m/s. The most favourable flow direction shall be used. Any signal emitted shall be recorded.

Annex J

High ambient temperature test

The detector shall be installed in the wind tunnel in its normal operating position with the most unfavourable flow direction and connected to its control and indicating equipment. The air temperature in the wind tunnel shall be θ = 23 ± 5 °C. The air temperature in the wind tunnel shall then be increased to 50 ± 2 °C at a rate of ≤ 1 °C/min.

Annex N

Shock test

The detector shall be mounted by means of its normal fastenings, at the centre of the underside of a timber beam in its normal operating position and shall be connected to the control and indicating equipment. The timber beam shall be of oak (European or American White)[1] and shall have cross-sectional dimensions of 100 mm x 50 mm. It shall be clamped on its narrower face to two oak supports of 50 mm width and of sufficient height that the detector does not touch the floor. The supports shall be placed freely on edge at 900 mm centres on a level concrete floor and at right angles to the longitudinal axis of the beam. A cylindrical steel block weighing 1 kg shall be dropped five times on to the centre of the upper horizontal face of the beam from a height of 700 mm. The area of impact of the weight is 18 cm^2 ± 10 %. The block shall be guided by suitable means so as to strike the beam with its longitudinal axis vertical.

A suggested but not compulsory form of apparatus is shown in figure 7.

After the test the response threshold value of the detector shall be measured according to annex B in the most unfavourable flow direction.

Of the two response threshold values measured in clauses 8 and 15, the greater is given the symbol y_{max} or m_{max}, the lesser value is given the symbol y_{min} or m_{min}.

Annex O

Impact test

O.1 Method of test

One detector shall be tested. The detector shall be mounted on a rigid horizontal backing board by means of its normal fastenings, in its normal operating position and connected to the supply and indicating equipment.

It shall be subjected to an impact of 1,9 ± 0,1 J delivered in a horizontal direction, at a velocity of 1,5 ± 0,125 m/s, by a swinging hammer having a hard aluminium head made from aluminium alloy Al-Cu4SiMg to ISO 209[2], solution treated and precipitation treated condition, with a plane impact face at an angle of 60° to the horizontal when in the striking position.

After the impact the detector and its connections shall remain undisturbed for at least 1 minute.

Without any change to the position of the detector relative to its mounting base or socket, the detector shall be disconnected from the supply and indicating equipment and shall be transferred from the impact test apparatus to the test tunnel, together with its backing board.

The response threshold value of the detector shall then be measured according to annex B in the most unfavourable flow direction.

Of the two response threshold values measured in clauses 8 and 16, the maximum value is given the symbol y_{max} or m_{max} and the minimum value the symbol y_{min} or m_{min}.

O.2 Apparatus

Unless otherwise specified all dimensions in O.2 are subject to a tolerance of ± 0,5 mm.

O.2.1 This apparatus (figure 8) consists essentially of a swinging hammer comprising a rectangular section head with a chamfered impact face mounted on a tubular steel shaft. The hammer is fixed into a steel boss which runs on ball bearings on a fixed steel shaft mounted in a rigid steel frame, so that the hammer can rotate freely about the axis of the fixed shaft. The design of the rigid frame is such as to allow complete rotation of the hammer assembly when the detector is not present.

O.2.2 The striker is of dimensions 76 mm wide x 50 mm deep x 94 mm long (overall dimensions). It has a plane impact face chamfered at 60 ± 1° to the long axis of the head. The tubular steel shaft has an outside diameter of 25 ± 0,1 mm with walls 1,6 ± 0,1 mm thick.

O.2.3 The striker is mounted on the shaft so that its long axis is at a radial distance of 305 mm from the axis of rotation of the assembly, the two axes being mutually perpendicular. The central boss is 102 mm in outside diameter and 200 mm long and is mounted coaxially on the fixed steel pivot shaft, which is 25 mm in diameter. The precise diameter of the shaft will depend on the bearings used.

O.2.4 Diametrically oppose the hammer shaft are two steel counter balance arms, each 20 mm in outside diameter and 185 mm long. These arms are screwed into the boss so that a length of 150 mm protrudes. A steel counter balance weight is mounted on the arms so that its position can be adjusted to balance the weight of the striker and arms, as in figure 8. On one end of the central boss is mounted a 12 mm wide x 150 mm in diameter aluminium alloy pulley and round this an inextensible cable is wound, one end being fixed to the pulley. The other end of the cable supports the operating weight.

O.2.5 The rigid frame also supports the mounting board on which the detector is mounted by its normal fixings and connected to its normal indicating equipment. The mounting board is adjustable vertically so that the centre of the impact face of the hammer will strike the detector when the hammer is moving horizontally, as shown in figure 8.

The blow shall be struck by the centre of the impact face and the azimuthal direction of impact, relative to the detector, shall be chosen as most likely to impair the normal functioning of the detector. A suitable but not compulsory apparatus is described in O.2 and shown in figure 8.

O.2.6 To operate the apparatus the position of the detector and mounting board is first adjusted as shown in figure 8 and the mounting board is then secured rigidly to the frame. The hammer assembly is then balanced carefully by adjustment of the counter balance weight with the

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1) European oak = *Quercus robur L.*
Quercus petraea Liebl.
American White oak = *Quercus spp.* principally
Quercus alba L.
Quercus prinus L.
Quercus lyrata Walt.

Annex R

Dielectric strength test

The detector shall be subjected to the following climatic conditions for at least 24 h:

Temperature: 25 ± 1 °C

Relative humidity: $50 \begin{smallmatrix}+3\\-2\end{smallmatrix}$ %

The detector shall be mounted in its normal position on a metal plate which is regarded as the earth connection. Using a voltage generator capable of delivering a sinusoidal voltage of between 40 Hz and 60 Hz, with an adjustable amplitude of 0 V to 1500 V r.m.s. (effective value), and a constant short-circuit current of 10 A r.m.s. (effective value), an increasing test voltage shall be applied between the metal plate and the short-circuited connecting wires.

This shall be carried out as follows:

(a) for detectors with nominal supply voltages of below 50 V, the test voltage shall be increased from 0 V to 500 V at a rate of 100 V/s to 500 V/s and maintained at the final magnitude for 60 ± 5 s;

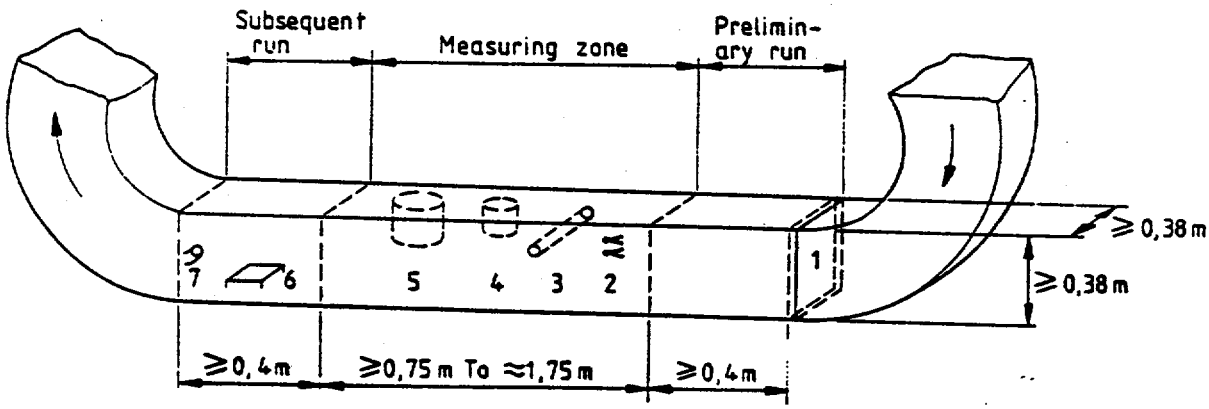
(b) for detectors with nominal supply voltages of more than 50 V and less than 500 V, the test voltage shall be increased from 0 V to 1500 V at a rate of 100 V/s to 500 V/s and maintained at the final magnitude for 60 ± 5 s.

Annex S

Low ambient temperature test

The detector shall be connected to its supply and indicating equipment and placed in a chamber at a temperature of between 15 °C and 25 °C for a period of at least 1 h. The air temperature in the chamber shall then be reduced to −20 ± 2 °C at a rate not greater than 0,5 °C/min. The detector shall be left at this ambient temperature for one hour to allow its temperature to stabilize. The conditions in the chamber shall be such that condensation or ice cannot form on the detector.

At the end of the stabilization period, the detector shall be removed from the chamber and kept for a period of 1 h to 2 h at an ambient temperature between 15 °C and 25 °C and at a relative humidity of 70 % or less. The response threshold value shall be measured and recorded according to annex B for the most unfavourable flow direction. Of the two response threshold values measured in the tests in accordance with clauses 8 and 20, the greater value is given the symbol y_{max} or m_{max}, the lesser value is given the symbol y_{min} or m_{min}.



(1) Sieve/Net
(2) Measurement of flow rate and temperature
(3) Optical measurement (light transmission method)
(4) Detectors to be tested } mounting on cover plate
(5) Ionization measuring chamber
(6) Heating element
(7) Aerosol supply

Figure 1. Arrangement of smoke detector and test apparatus in the wind tunnel

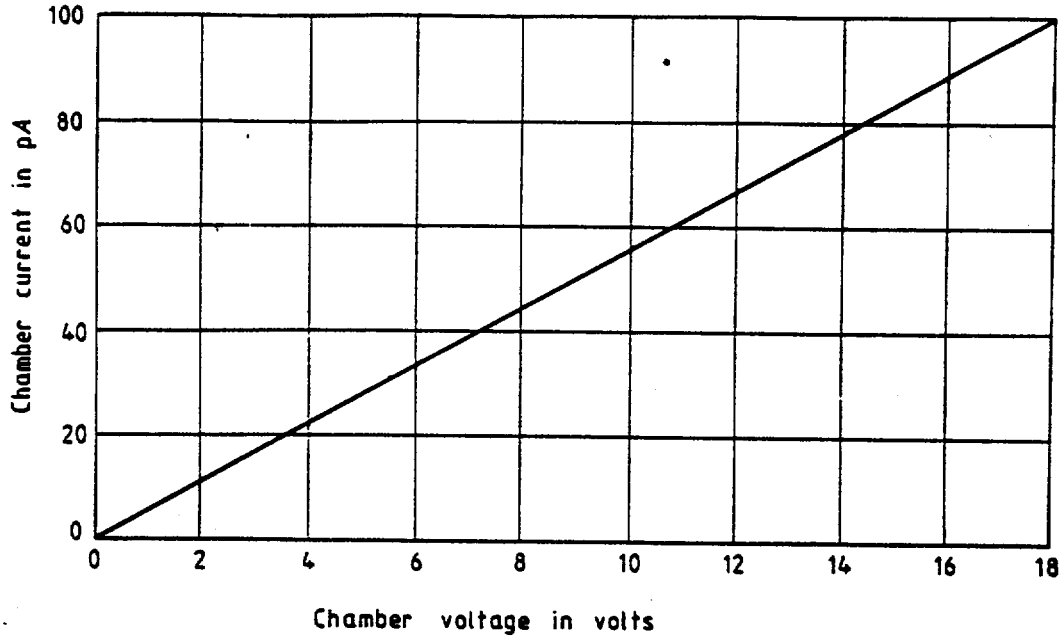


Figure 4. Ionization measuring chamber; current-voltage characteristic

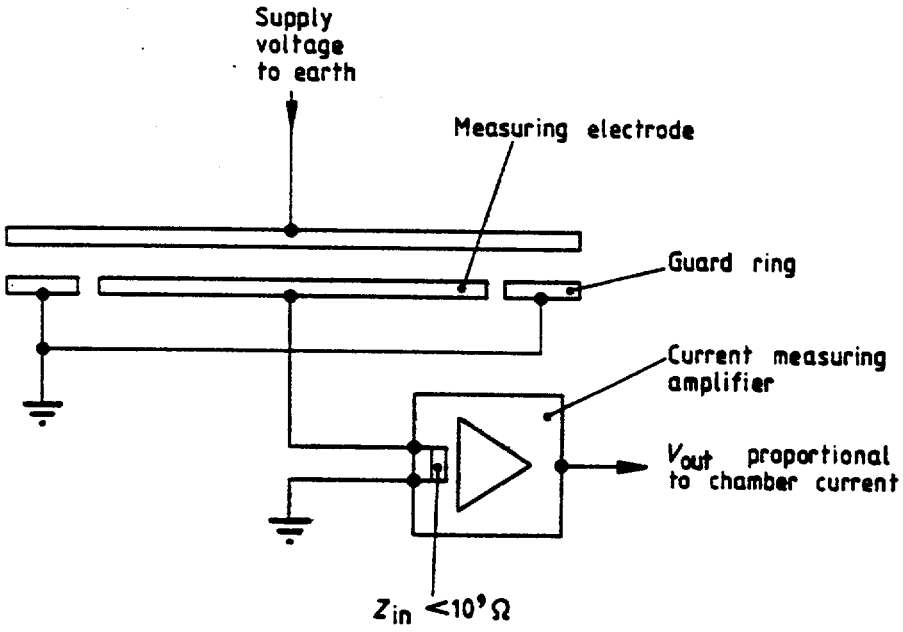
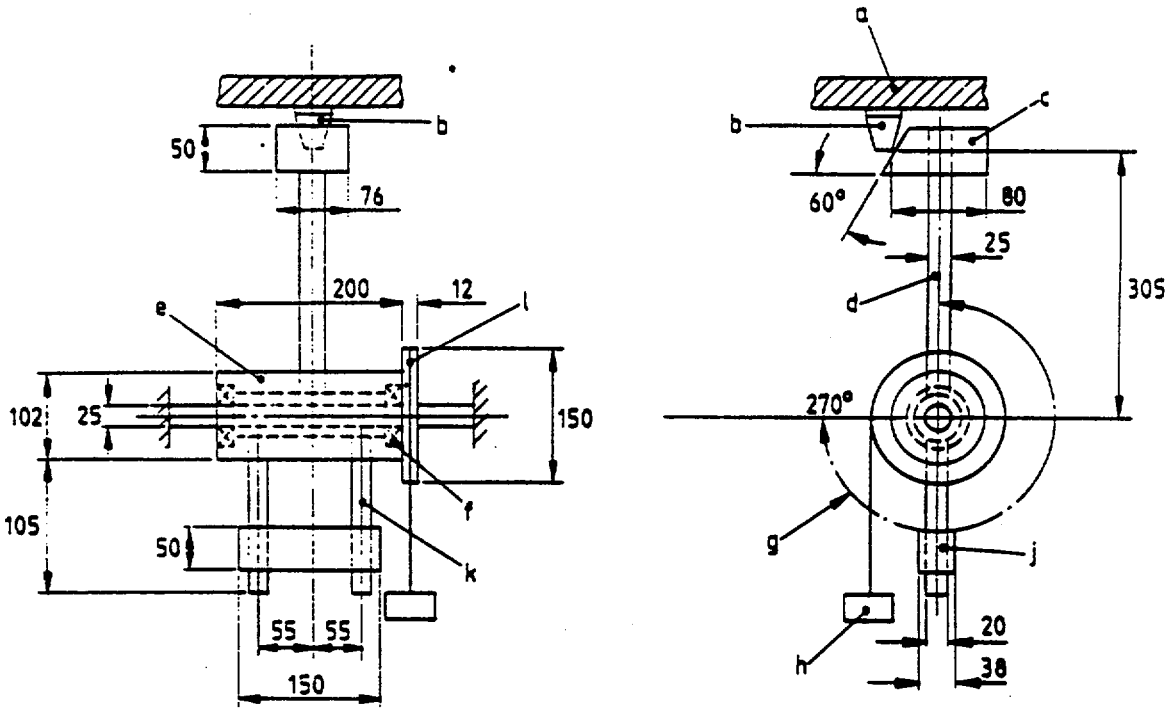


Figure 5. Operating circuit



a) Mounting board
b) Detector
c) Striker
d) Striker shaft
e) Boss
f) Ball bearings
g) 270° angle of movement
h) Operating weight
j) Counter balance weight
k) Counter balance arms
l) Pulley

Dimensions in millimetres

NOTE. The sizes given to the dimensions are for guidance only.

Figure 8. Impact apparatus

National appendix Y

Publications referred to

*EN 54 : Part 1	
published as	BS 5445 : Part 1 : 1977 Components for automatic fire detection systems Part 1 Introduction
*EN 54 : Part 5	
published as	BS 5445 : Part 5 : 1977 Components for automatic fire detection systems Part 5 Heat sensitive detectors — point detectors containing a static element
*EN 54 : Part 8	
published as	BS 5445 : Part 8 : 1984 Components for automatic fire detection systems Part 8 Specification for high temperature heat detectors
EN 54 : Part 9	
published as	BS 5445 : Part 9 : 1984 Components for automatic fire detection systems Part 9 Methods of fire sensitivity test
*BS 1470	Wrought aluminium and aluminium alloys for general engineering purposes — plate, sheet and strip
BS 5839	Fire detection and alarm systems in buildings Part 1 Code of practice for installation and servicing
ISO 209	Composition of wrought products of aluminium and aluminium alloys — Chemical composition (per cent)

NOTE. As explained in the national foreword, the reference in the text to ISO 209 is to a material that is equivalent to an aluminium alloy in BS 1470 : 1972.

National appendix Z

National committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Fire Standard Committee (FSM/—) to Technical Committee FSM/12 upon which the following bodies were represented:

Association of Manufacturers Allied to the Electrical and Electronic Industry (Beama Ltd)
British Fire Protection Systems Association Ltd
British Telecommunications
Chartered Institution of Building Services
Chief and Assistant Chief Fire Officers Association
Department of Health and Social Security
Department of the Environment, Building Research Establishment (Fire Research Station)
Department of the Environment, Property Services Agency
Department of Transport — Marine Directorate
Electrical Contractors Association
Electrical Installation Equipment Manufacturers Association (Beama Ltd)
Fire Insurers Research and Testing Organization (FIRTO)
Fire Offices Committee
Fire Protection Association
Greater London Council
Home Office
Institution of Electrical Engineers
Institution of Fire Engineers
Ministry of Defence
Royal Institute of British Architects
Telecommunication Engineering & Manufacturing Association (TEMA)

The following body was also represented in the drafting of the standard:

Electricity Supply Industry in England and Wales

*Referred to in the national foreword only.

Grinnell®
FIRE PROTECTION SYSTEMS COMPANY
835 Sharon Drive
Westlake, Ohio 44145

A tyco INTERNATIONAL LTD. COMPANY

July 20, 1998

Changes for Registry No: NR-776-D-101-E dated September 16, 1994

Model Designation:

The model designations MF Series, OID (P/N PU 90-2000-1 and P/N 90-41000-1), NID-58 and NID-68 AS Series are no longer manufactured.

The new model designation is Lo-Pro Series

Distributor:

The distributor has been changed to Grinnell Fire Protection Systems Co. as described in the application to amend license 34-23772-01. This section should read

Grinnell Fire Protection Systems Co.
835 Sharon Drive
Westlake, Ohio
(440) 871-9900

The manufacturer is still Thorn Security Limited, but does business as Tyco Electronic Products Group. The correspondence and documentation related to their activities bear either name.

Nittan Company, LTD. no longer produces the series of detectors applicable with this registry.

Sealed Source Model Designation

Current information will remain the same

Isotope: **Maximum Activity:**

Current information will remain the same

Leak Test Frequency:

Current information will remain the same

Principle Use:

Current information will remain the same

Custom Device:

Current information will remain the same

Device Type:

Current information will remain the same

Device Type:

The Lo-Pro series Ion Detectors consist of models 612 and 912 and is intended for commercial use. Both detectors use the same mechanical construction. Different performance characteristics are obtained by variations in the electrical circuity.

References

Due to the fact that Thorn Security Limited and Nittan Company LTD no longer manufacture the models listed on the registry, the documents listed under References no longer apply. They are identified below and attachments are included with this amendment.

Attachment #	Date	Description
A1-1	October 25, 1989	Request for evaluation and Registration of MF312 Ion Chamber Detectors
A1-2	May 31, 1990	Supplement to submission for MF series detector evaluation
A1-3	July 20, 1990	The label is no longer valid, the only place it can be found is on existing detectors.
A1-4	August 26, 1993	
A1-5	February 10, 1994	Change of address notification
A2-1	March 14, 1990	Application for License to Possess MF 312 Ion Detectors
A2-2	August 9, 1990	Thorn quality procedure no longer applies. Replaced as identified in section III of this application. Appendix E7
A2-3	October 10,1991	Amendment request for Nittan Detectors which are no longer manufactured and attached News release of Autocall purchase
A2-4	April 25, 1994	Request for transfer of licenses to Mattingly One Limited
A2-5	August 18, 1994	Change of status letter
A3	November 15, 1990	Updated documents for license 12-16029-01E
A4	March 13, 1992	Affidavit signed by E. Joseph Martini.

THORN SECURITY

THORN SECURITY Limited
Security House
Twickenham Road
Feltham
Middlesex. TW13 6JQ
England
Telephone: 01-755 3333
Telex: 8814916
Fax: 01-755 0831

Mr.Floyd DesChamps
Commercial Section-Medical, Academic
and Commercial Use Safety Branch
United Staes Nuclear Regulatory Commission
Washington D.C. 20555
U.S.A.

Our Ref:MF312 Your Ref:

31 May 1990

Dear Mr. DesChamps

Registration of Ion Chamber Smoke Detectors

Following your correspondence on the above subject and the subsequent telephone conversations with our Roger Barrett, we are enclosing a set of replies prepared by him against your questions.

It is our belief that all the outstanding matters are resolved by the enclosed documents, but if further clarification is needed, please do not hesitate to contact us again. We are eager to meet all your specified requirements as soon as possible because our application to UL for listing is nearing completion.

Very best regards

Yours sincerely

Peter Carlton
PDS Manager

Attachment A1-2

REGISTRATION OF MF-SERIES ION CHAMBER SMOKE DETECTORS

Supplement to Submission

The points given below are supplementary to the original submission of the THORN Security MF Series detectors dated 18 October 1989. The section numbers refer to the numbered questions in the letter from Mr Floyd DesChamps of NRC, dated 28 March 1990.

1. We would like the registration to cover the MF series of detectors. The series currently includes the following types which are intended for sale in the USA:

   MF312 MF412 MF512

2. We can confirm that the mandatory information will be included in the labelling for the point-of-sale packaging. We propose to use a label of the type described in the "LABELLING AND PACKAGING" section on page 10 of the application document.

3. A copy of BS5445 Part 7 is attached as requested.

   We are also attaching additional information covering further type testing of the MF series detectors. This is a copy of a report produced by the National Radiological Protection Board detailing testing of the MF301 detector to the NEA recommendations. We submit that the tests are also applicable to the MF312, MF412 and MF512 variants which use the same housing and source assembly.

4. The dose rates quoted refer to an activity of 0.9 microcuries of Americium 241.

5. Section 32.27 a):

   In normal use of the detector, the highest exposure will be experienced by installation and service personnel. It can be assumed that these personnel will be handling detectors singly and may be in contact with them for, say, a maximum of one hour per day or two hundred and fifty hours per year. This would result in an absolute maximum dose of 0.0015 rad to the hands of the personnel concerned (using the figures given on page 7 of the submission document) which is below the maximum level in Column I of the table in 32.28.

   During storage and distribution the personnel having the highest exposure will be those in the warehouse where they are initially stored. The detectors will be imported by THORN Automated Systems Inc. and will be stored in a locked caged portion of their warehouse facility prior to distribution. The personnel handling detectors will be trained in their correct handling and will avoid prolonged exposure. It can be assumed that these workers will experience exposure to hands and feet from boxes of detectors for, say, one hour per day resulting in a total dose of the order of 0.015 rad. This again is well below the level given in Column I of the table in 32.28.

The entire facility is protected with a fire alarm and security system armed with motion monitoring devices to detect unauthorized movement within the building. The risk to persons other than authorized personnel is therefore reduced to a minimum.

Section 32.27 b):

The effectiveness of the containment of the source during normal use is demonstrated by the type testing of the detector against fire detector standards such as BS5445. The physical tests conducted and reported in the test report TE30200 show that the mechanical structure is capable of withstanding normal and abnormal handling without loss of integrity. This conclusion is also supported by the more recent tests conducted by NRPB.

Section 32.27 c):

The testing cited in 6. above, particularly that conducted by NRPB, covers "credible abuse and likely accidental damage" to the detectors. Results show that the probability of loss of integrity of the containment is acceptably low. In the unlikely event that the housing of the detector is damaged to the extent that the outer cover is removed, the maximum dose is still limited to 0.05 rad per year. Hence, the probability of exceeding the dose of Column II of 32.28 is low.

The worst scenario is that of a fire in the warehouse in which large numbers of detectors are stored. We can assume that at any time the warehouse holds a stock of 5,000 detectors (i.e. approximately one month's usage). The fire and incineration tests indicate that if 5,000 detectors were completely destroyed in a fire, the total activity released would be 37*5,000 Bq or 185 kBq (5 microcuries). This activity would be spread by the fire plume over an area of say 1,000,000 square metres, resulting in a contamination level of $5*10^{-6}$ microcuries per square metre. This low level of contamination would result in doses many orders of magnitude lower than those given in Column II of 32.28.

6. The manufacturing procedure has been revised to include a wipe test on 100% of detectors. The updated Quality Plan reflects this change.

R Barrett
30 May 1990

- Sample perform parts
- Final a-

National Radiological Protection Board, Northern Centre, Hospital Lane, Cookridge, Leeds LS16 6RW
Telephone: (0532) 679041 · Fax: (0532) 613190

Consumer Products Report

Report Number:	NRPB/CP 3/037
Report for:	Mr P Carlton Thorn Security Limited Security House Twickenham Road Feltham Middlesex TW13 6JQ
Subject:	Testing Ionisation Chamber Smoke Detectors to NEA recommendations
Sample:	Multistation Ionisation Chambers Smoke Detector Model MF301 + MF300 base.
Date of completion of tests:	25th April 1990
Date of report:	26th April 1990

Introduction

The ionisation chamber smoke detector contains an Americium-241 with an activity of 33.3 kBq [0.9 μCi]. The detectors were assessed for compliance with the requirements of the recommendations of the Nuclear Energy Agency (Ref. 1).

NEA Preliminary Tests

Access to the source

Access to the source can only be gained by removing the detector from its base and forcibly dismantling it.

Marking and Labelling

The base of the detector head bears an adhesive paper label. This label bears the following wording 'Caution - contains radioactive material - Americium-241, 33.3 kBq and the radiation trefoil symbol.

Dose Rates

A photon spectrum from a single smoke detector was accumulated using a shielded lithium drifted silicon detector. Dose rates were calculated using the known efficiency of the silicon detector and appropriate dose rate conversion factors. The results were used to calibrate a low energy photon scintillation probe. Dose rates from the other detectors were measured using the scintillation probe.

The maximum dose equivalent rate measured was 2.3×10^{-3} $\mu Sv\ h^{-1}$ at a distance of 0.1 metres from the surface of the smoke detector. The NEA requires that the dose rate does not exceed 1 $\mu Sv\ h^{-1}$ at a 0.1 metres from the surface of the detector.

Contamination

Surface contamination was assessed by wiping each detector with methanol moistened swabs and measuring the transferred activity using an alpha scintillation drawer. The following areas of the detectors were checked.

(i) The outer surface of the detector
(ii) The inner surface of the ionisation chamber
(iii) The source and soure holder

In all cases the levels of radioactive contamination assessed were less than 0.37 Bq cm^{-2}. The NEA states that a detector shall fail the initial tests if the contamination exceeds this value.

Additional NEA tests

The NEA testing programme is intended to simulate the damage and other effects produced by normal use, credible abuse and likely accidental damage. The programme is detailed in reference 1. The integrity of the sources before and after each test was assessed principally by wipe testing as described above. With the exception of the 600°C fire test and the 1200°C incineration test the results are given below.

Test	Activity transferred from the source after test (Bq)
Temperature	< 0.1
Impact	< 0.1
Drop	< 0.1
Vibration	< 0.1

A source is considered to have retained its integrity if the removed activity is less than 185 Bq.

Fire Test at 600°C and Incineration Test at 1200°C

The procedure and apparatus used for the 600°C and 1200°C tests are detailed in reference 1.

The measured activities in each part of the apparatus after the test are given in the table below.

Apparatus	Measured Activity in Bq	
	600°C	1200°C
Vapour Trap	< 37	< 37
Filter	< 0.1	< 0.1
Debris	< 0.1	-
Source	< 0.1	-
Total	< 37.3	< 37.1

A detector is considered to have failed the 600°C test if the sum of activity remote from the source exceeds 185 Bq.

For the 1200°C test, a detector is considered to have failed if the activity in the vapour trap and on the filter exceeds 1% of the source activity.

Conclusion

The smoke detectors performed satisfactorily in the NEA tests.

J Dunderdale

Note: This report covers the following additional detectors and bases which would perform in the NEA test similarly to the above detector and base.

MF301L MF301H MF301D MF301DH	MF301Ex MF300Ex	MF401 MF501 MF500 MF501Ex MF500Ex
PF301 PF301L PF301H PF301D PF301DH P300	PF301Ex P300Ex	PF501 P500 PF50Ex P500E

Reference 1. Recommendations for ionisation chambers smoke detectors in implementation of radiation protection standards. Nuclear Energy Agency of the Organisation for Economic Co-operation and Development 1977.

JD/PVS/JEW
26/4/90
CP 3.15

THORN Security

THORN Security Limited
Technology Centre
Dawley Road
Hayes
Middlesex UB3 1HH
Telephone 081-848 9779
Fax 081-848 6565
Telex 934135

Mr Floyd DesChamps
Commercial Section-Medical, Academic
and Commercial Use Safety Branch
United States Nuclear Regulatory Commission
Washington D.C. 20555
U.S.A.

20 July 1990

Dear Floyd,

MF312 Ion Chamber Detectors

Enclosed is a copy of the drawing of the label we shall be fitting to the cover of the Chamber of the above detector.

This is in line with our previous discussions and completes the package of information needed for NRC registration of our detector.

We look forward to receiving formal registration within the next week or two.

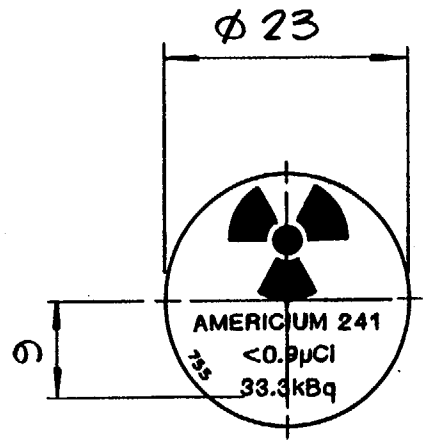
Very best regards,

Yours sincerely,

P Carlton
PDS Manager

A 1-3

ATTA



NOTES:

1. LABEL IS TO BE PUNCHED OUT OF A PAPER ROLL OF TAPE ON SUPPORT FILM.
2. ARTWORK SYMBOL AND LEGENDS ARE TO BE MATT BLACK AND LABEL BACKGROUND IS TO BE MATT WHITE.
3. LABEL ARTWORK IS TO BE DISPOSED ABOUT THE HORIZONTAL CENTRE LINE AS SHOWN AND IT IS TO BE EQUALLY DISPOSED ABOUT THE VERTICAL CENTRE LINE.
4. FOR ARTWORK SEE SHEET 2 OF THIS DRAWING.

ISSUE	APP'D	
A 10/7/90		

IF IN DOUBT - ASK!

DO NOT SCALE - REMOVE ALL BURRS AND SHARP EDGES - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED TO BE READ IN CONJUNCTION WITH BS 308

THORN Security Limited

A3

TITLE: ION CHAMBER LABEL

DRAWN: GAH 10/7/90 ENG'R:

DEV. No. 066/303/3

DRAWING No. 120-147-755

SHEET 1 OF 2

MATERIAL: SEE NOTE 1.

FINISH: ——

SCALE 2:1 THIRD ANGLE PROJECTION

TOLERANCES (UNLESS STATED)

GENERAL	± 0.4 mm
HOLE CENTRES	± 0.12mm
HOLE DIAMETERS	+ 0.1 mm − 0
ANGULAR	± 30'

RELEVANT DRAWINGS

USED ON: 516-020-007

THORN Security Limited

AMERICIUM 241

755

<0.9µCi

333kBq

REDUCE TO 100mm

DRAWING No. 120-147-755 ISS. A

APP'D	QR																								
ISSUE	A 10/7/90																								

IF IN DOUBT - ASK!

DO NOT SCALE - REMOVE ALL BURRS AND SHARP EDGES - ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED TO BE READ IN CONJUNCTION WITH BS 308

TITLE: ION CHAMBER LABEL

DRAWN: GAH 10/7/90 ENG'R: [illegible]

DEV. No. 066/303/3

DRAWING No. 120-147-755

SHEET 2 OF 2

MATERIAL: SEE SHEET 1

FINISH: —

SCALE 4:1 THIRD ANGLE PROJECTION

TOLERANCES (UNLESS STATED)

GENERAL	± 0.4 mm
HOLE CENTRES	± 0.12mm
HOLE DIAMETERS	+ 0.1 mm, − 0
ANGULAR	± 30'

RELEVANT DRAWINGS

USED ON: 516-020-007

A3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

IMPORTANT NOTICE

PURCHASE ORDERS/PAYMENT

The invoice for the fee(s) and associated interest, penalties, and administrative costs, if any, constitutes a debt to the United States pursuant to Federal law and implementing regulations. Please do not send a purchase order for NRC's completion in order to effect payment of the invoice. The NRC will not accept or execute any purchase order submitted by an applicant/licensee as a condition to the applicant/licensee paying this debt. The NRC also reserves the right not to accept or execute any claim form or other document submitted by an applicant/licensee as a condition to the applicant/licensee paying this debt. If a purchase order is sent without payment and the invoice becomes past due, the NRC will not waive any interest, penalties, or administrative charges upon receipt of the payment.

Payment should be made by check, draft, money order, or electronic funds transfer and made payable to the U.S. Nuclear Regulatory Commission. In order to ensure that your account is properly credited, please reference your invoice number(s) on your payment or return the payment copy of your invoice(s) with your remittance. Federal agencies may also make payment by the On-Line Payment and Collection System (OPAC).

ATTACHMENT A1-4

Mr F Deschamps
Nuclear Regulatory Commission
Commercial Section - Medical,
Academic & Commercial Use
Safety Branch
Washington DC 20555
U S A

THORN Security Limited
Security House
The Summit
Hanworth Road
Sunbury-on-Thames
Middlesex
TW16 5DB
Telephone 0932 743333
Fax 0932 743155
Telex 8814916

Date: 10th February 1994

Dear Mr Deschamps

Change of Address for THORN Security Technology Centre

Would you please note that from the 18th February 1994, our Technology Centre - which includes the research and development activities and all approvals activities for products - will be permanently re-located to our new head office site. The details of the address, telephone number etc, are given below:

THORN Security Ltd Technology Centre
The Summit
Hanworth Road
Sunbury-on-Thames
Middlesex
TW16 5DB

Tel: No. 0932 743333
Fax: No. 0932 743155

For direct contact with the undersigned, please use telephone number 0932 743243.

Would you be kind enough to amend your records accordingly. We trust this will not involve you in excessive internal work, but if any re-registration fees are payable, please send the invoice to the new address, marked for my attention.

Very best regards

Yours sincerely

Peter Carlton
Principal Engineer (Approvals)

ATTACHMENT A1-5

Registered Office
Security House
The Summit
Hanworth Road
Sunbury-on-Thames
Middlesex TW16 5DB
Registered in England No.728346

THORN Automated Systems Inc.

Corporate Offices
835 Sharon Drive
Westlake, Ohio 44145
(216) 871-9900
FAX (216) 871-8320

March 14, 1990

Mr. Bruce Carrico
Nuclear Regulatory Commission
Mail Stop OWFN-6H3
Washington, D.C. 20555

Subject: Application for Licence to Distribute THORN Security MF312 Ionisation Chamber Smoke Detector

Dear Mr. Carrico:

Pursuant to our conversation enclosed is our application and fee of $580.00 along with (2) sets of documentation required for THORN Automated Systems request to be the licenced distributor of THORN Security LTD detectors in the U.S.A.

THORN Security Limited filed an application for registration of model MF312 ion chamber smoke detector with Mr. Stephen Baggett of the NRC in Washington D.C. on October 25, 1989. Included in their application was information required for 10 CFR PT 32.26-.27-.28.29. I understand this application has not yet been processed and that our application to distribute will be processed along with it.

I would also reaffirm that THORN Automated Systems fully understands its responsibilities in maintaining proper transfer records, quality assurance, and test records.

THORN Automated Systems will distribute this product from our headquarters located at 835 Sharon Drive, Westlake, OH 44145. Detectors will be shipped to end-users in their original packages with no modifications. Labeling will be in accordance with NRC regulations.

I would also note that these detectors are intended for use in industrial/commercial fire detection systems. They are not intended for sale to the general public for domestic applications.

We have also filed applications for licence to possess these detectors with Mr. Bill Adam at NRC District III Glen Ellyn, IL 60137 on 3/14/90.

ATTACHMENT 12

I would also note that professional consultants have been retained to perform required training of our personnel to conform to all NRC test and safety regulations.

Thank you for your assistance and please feel free to contact me if you have any questions.

Very truly yours,

E. Joseph Martini

Vice President of Manufacturing/Operations

cc: R. Elzer
L. Kaiser
D. Ross

NRC FORM 374
(10-89)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Thorn Automated Systems, Inc.	3. License number 34-23772-01
2. 835 Sharon Drive Westlake, OH 44145	4. Expiration date May 31, 1995
	5. Docket or Reference No. 030-31617

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Americium-241	A. Foil sources (Amersham Int., Inc. Model No. AMM 1001H)	A. No single foil to to exceed 0.9 microcuries, 45 millicuries, total

9. Authorized Use

A. To be used for storage in Thorn Security MF Series ionization smoke detectors incident to distribution in accordance with the conditions of NRC Byproduct Material License No. 34-23772-02E.

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at 799 Sharon Drive, Westlake, Ohio and 835 Sharon Drive, Westlake, Ohio.

11. Licensed material shall be used by, or under the supervision of, Daniel Speese or E. Joseph Martini.

12. This license does not authorize commercial distribution of licensed material.

13. Licensed material shall not be used in or on human beings.

14. Sealed sources containing licensed material shall not be opened.

15. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under the license. Records of inventories shall be maintained for 2 years from the date of each inventory.

5

COPY

THORN Automated Systems Inc.

Corporate Offices
835 Sharon Drive
Westlake, Ohio 44145
(216) 871-9900
FAX (216) 871-8320

March 14, 1990

TO: DR. BILL ADAM
United States Nuclear Regulatory Commission
Region 111
799 Roosevelt Road
Glen Ellyn, IL 60137

Subject: Application for Licence to Possess THORN Security MF312 Ionisation Chamber Smoke Detectors.

Dear Dr. Adam:

Pursuant to our conversation enclosed is our application and fee of $230 along with two (2) sets of documentation required for THORN Automated Systems request to be licenced to possess THORN Security Detectors in the U.S.A

Also enclosed for your information is summary data and technical information on the detectors.

Thank you for your valuable assistance in helping us prepare this application and please do not hesitate to contact me if you require any further information. I would appreciate your help in securing this licence as quickly as possible.

Very truly yours,

E. Joseph Martini

E. Joseph Martini

Vice President Manufacturing/Operations

cc: R. Elzer
L. Kaiser
D. Ross

NRC Form 374A (9-84)

U.S. NUCLEAR REGULATORY COMMISSION

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License number: 34-23772-01

Docket or Reference number: 030-31617

16. The licensee shall maintain records of information important to safe and effective decommissioning at 799 Sharon Drive, Westlake, Ohio per the provisions of 10 CFR 30.35(g) until this license is terminated by the Commission.

17. The licensee may transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

18. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Application dated March 14, 1990.

For the U.S. Nuclear Regulatory Commission

Date: April 5, 1990

Original Signed
By William J. Adam, Ph.D.
Materials Licensing Section, Region III

COPY