



Factory Mutual Research

1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062

J.I. 0T0A9.AY
(3210)

October 3, 1990

TYPE EPC LINEAR HEAT DETECTION CABLE FOR FIRE ALARM SIGNALING SYSTEMS

from

The Protectowire Company
P. O. Box A
Hanover, MA 02339

I INTRODUCTION

1.1 The Protectowire Company requested FMRC Approval of their Type EPC linear heat detector cable for use with fire alarm signaling systems.

1.2 Type P, WPP, WFR cables were previously examined under FMRC Report 0E0A9.AY. The difference between the previously examined cable and EPC cable is the outer cover material. Type P has a tape wrap; Type WPP has a tape wrap over asphalt; Type WFR has a cotton braid cover; Type EPC has an extruded PVC cover.

1.3 The following standard was used for the examination and evaluation of the equipment included in this report:

Factory Mutual Research Corporation, Approval Standard Thermostats for Automatic Fire Detection, Class 3210 (July 1978)

1.4 The Protectowire listing in the Factory Mutual Research Approval Guide under Fire Detection, Heat-Actuated will be revised to add the following to the existing listing:

Type P, WPP, WFR, EPC, fixed temperature, heat-sensitive cable for area heat detection: regular, 155°F (68°C); intermediate, 190°F (88°C); high 280°F (138°C). Rated for 30Vac, 42Vdc. Spacing Guide: 25 ft. X 25 ft. (7.6m X 7.6m) max.

II DESCRIPTION

2.1 The EPC cable is a line type heat detector comprised of two actuators encased in a heat sensitive material. The actuators are twisted together to impose a spring pressure between them. The actuators are wrapped in a protective Mylar film and the entire cable is PVC jacketed. At its rated temperature, the heat sensitive coating on the actuating conductors softens resulting in the conductors coming into electrical contact with each other. The principle of operation and installation requirements are further described in the attached literature.

2.2 The EPC is available in three fixed temperatures: regular, 155°F (68°C); intermediate, 190°F (88°C); high test 280°F (138°C). The cable is color coded as follows: regular (red), intermediate (white), and high test (blue). All cables are rated for 30Vac, 42Vdc.

III MARKING

Each cable has the manufacturer's name, type of device, Factory Mutual Research Approval mark, cable type, and fixed temperature rating printed on the outer jacket. The marking is repeated every 24 inches (61cm).

IV TESTS AND EXAMINATIONS

4.1 Tests were conducted at Factory Mutual Research Corporation (FMRC) in Norwood, MA and W. Glocester, RI on representative samples of the equipment covered by this report. All samples were compared with appropriate drawings and component information supplied by the manufacturer and found to meet FMRC requirements.

4.2 **Operational Testing** - The EPC heat detector cable was tested to verify the manufacture's performance claims and the following FMRC Approval requirements:

4.2.1 **Directional Sensitivity** - Samples of the detector cable were examined and found to have no directional sensitivity. The sensing element is symmetrical about the horizontal axes. There is no baffling or other deformation which would deflect convective air currents.

4.2.2 **High Ambient Stability Test** - Samples were subjected to a temperature 10% below the rated operating temperature; regular, 140°F (61°C); intermediate, 171°F (80°C); high test 252°F (124°C). The cable did not false alarm during the 24 hour test periods.

4.2.3 **Full Scale Fire Test** - A full scale fire test was conducted under a 15 ft. (4.6m) ceiling using a 10 square foot (0.9 square meter) heptane pan fire. The response time of the automatic sprinklers rated at 160°F (71°C), 212°F (100°C), and 280°F (138°C) located on 10 ft. (3m) spacing were compared with the responses of the 155°F (68°C), 190°F (88°C), and 280°F (138°C) cables. The results of these tests showed that the "listed spacing" for the Protectowire cable is 25 ft (7.6m). Listed spacing is the maximum spacing for an FMRC Approved heat actuated fire detector.

4.3 **Dielectric Tests** - A test voltage of 500 volts rms was applied for one minute between the conductors and the outer jacket. No arcing, dielectric breakdown or leakage current was observed during or at the end of these tests.

4.4 Due to the similarity to cable previously tested under FMRC Report 0E0A9.AY no further testing was deemed necessary.

V FACILITIES AND PROCEDURES AUDIT

Protectowire's manufacturing facilities in Hanover, MA is currently included in FMRC's Facilities and Procedures Audit program. The addition of this equipment to the manufacturer's currently Approved product line represented no change to manufacturing or quality control procedures that would require a special audit. The facilities and quality control procedures will continue to be inspected annually for as long as this Approval is in effect.

VI MANUFACTURER'S RESPONSIBILITIES

6.1 The manufacturer shall provide instructions for installation, operation, and maintenance with each unit of cable.

6.2 The manufacturer shall advise Factory Mutual Research Corporation of all proposed changes to the material shown in the Documentation List (Appendix I) of this report via the Approved Product Revision Report (Form 797).

VII CONCLUSION


The Type EPC linear heat detector cable meets FMRC requirements. Approval will be effective when the Approval Agreement is signed and received by FMRC.

ORIGINAL DATA: Test Notebook No. 90-488


ATTACHMENTS Appendix I - Documentation list
System Component (Form 6592 I)
"Specifications for Installing Protectowire
Line Heat and Fire Detector" (Form 2053C)

EXAMINATION AND TESTS BY: M. E. Brown, Jr.

REPORT BY:


M. E. Brown, Jr.
Project Engineer
Systems Section

REVIEWED BY:


J. L. Abbott, Manager
Systems Section

Appendix I

Class 3210

DOCUMENTATION LIST

<u>DESCRIPTION</u>	<u>DRAWING NO.</u>	<u>REV</u>	<u>DATE</u>
Composition Data Sheet	DS-8977	A	7/89
Outer Jacket Markings	DS-8972	-	9/10/90

APPROVAL REPORT

TYPE EPR LINEAR FIRE DETECTION CABLE FOR ALARM SIGNALING SYSTEMS

Prepared For:

The Protectowire Company, Inc.
P. O. Box A
Hanover, MA 02339

0Z8A7.AY

(3210)

Date: February 7, 1996



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Factory Mutual Research

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0Z8A7.AY
(3210)

February 7, 1996

TYPE EPR LINEAR FIRE DETECTION CABLE FOR ALARM SIGNALING SYSTEMS

from

The Protectowire Company, Inc.
P. O. Box A
Hanover, MA 02339

I INTRODUCTION

1.1 The Protectowire Company requested FM Approval of their Type EPR linear heat detector cable. This cable is used with fire alarm signaling systems; however, the "extra high" (356°F/ 180°C) cable is not intended for area coverage and is to be used for proximity detector applications only.

1.2 The "standard construction" Type P, WPP, and WFR cables were previously examined under FM Report 0E0A9.AY. Type EPC cables were previously examined under FM Report 0T0A9.AY, and type EPN cables were examined under FM Report 0W1A9.AY. The difference between the previously examined cables and EPR cable is the outer cover material. The standard construction has a cotton braid; Type P has a tape wrap; Type WPP has a tape wrap over asphalt; Type WFR has a fiberglass braid cover over fire retardant tape wrap; Type EPC has an extruded PVC cover; Type EPN has a black nylon jacket, 0.005 inch thick over the PVC; and Type EPR has an extruded polypropylene based elastomer cover which has been extruded with a UV stabilizer.

1.3 The following standard was used for the examination and evaluation of the equipment included in this report:

Factory Mutual Approval Standard - Thermostats for Automatic Fire Detection,
Class 3210 (July 1978)

1.4 The Protectowire listing in the Factory Mutual Approval Guide under Fire Detection, Heat-Actuated will be revised to read as follows:

Type P, WPP, WFR, EPC, EPN, and EPR fixed temperature, heat-sensitive cable for area heat detection. Rated operating temperatures are: regular, 155°F (68°C); intermediate, 190°F (88°C); high, 280°F (138°C). Types EPC, EPN, and EPR also have an extra high, 356°F (180°C) which is intended for proximity detection only. Rated for 30 V ac, 42.4 V dc. Spacing guide for all but the "extra high" cables: 25 ft. X 25 ft. (7.6m X 7.6m) max.

II DESCRIPTION

2.1 The following paragraphs and the attached manufacturer's literature describe the EPR fixed temperature, heat-sensitive cable. The manufacturer has made available all necessary component specifications which have been examined and are retained on file at Factory Mutual.

2.2 The EPR cable is a line type heat detector comprised of two conductors encased in a heat sensitive material. The conductors are twisted together to impose a spring pressure on them. The conductors are wrapped in a protective Mylar polyester film and the entire cable is jacketed with an extruded polypropylene based elastomer cover which also has a UV stabilizer. At its rated temperature, the heat sensitive coating on the actuating conductors softens resulting in the conductors coming into electrical contact with each other. The principle of operation and installation requirements are further described in the attached literature.

2.3 The EPR cable is available in four fixed trip temperatures: regular, 155°F (68°C); intermediate, 190°F (88°C); high, 280°F (138°C); and extra high, 356°F (180°C). The extra high is intended to be used as a proximity detector only, and it is not suitable for open area protection.

2.4 The outer jacket of the 155°F, 190°F, and 280°F cables is gray, and the 356°F cable is black.

2.5 All cables are rated for 30 V ac, 42.4 V dc. Resistance is approximately one ohm per 5 feet (1.5 m) of twisted pair.

2.6 The cable is spliced using a connector designated as "PWSC." The suitability of these connectors for outdoor use, and the means for sealing it watertight, have not been evaluated, and therefore outdoor use is not covered by this Approval.

III MARKING

Each cable has the manufacturer's name, cable type, Factory Mutual Approval mark, fixed temperature rating, and a "do not paint" statement printed on the outer jacket. The marking is repeated every 18 inches (46 cm).

IV EXAMINATION AND TESTS

4.1 Tests were conducted at Factory Mutual in Norwood, MA on representative samples of the cables covered by this report. All samples were compared with appropriate drawings and component information supplied by the manufacturer and found to meet FM requirements.

4.2 **Temperature Rating** - A sample of each temperature rating was tested and found to operate within 3% of its rated fixed temperature (expressed in °F), when the ambient temperature increased at less than 2°F (1.1°C) per minute.

4.3 **Dielectric Tests** - A test voltage of 500 volts rms was applied for one minute between the conductors and the outer jacket. No arcing or dielectric breakdown was observed during or at the end of these tests.

4.4 Due to the similarity to cable previously tested under FM Reports 0T0A9.AY and 0W1A9.AY, no further testing was necessary.

V FACILITIES AND PROCEDURES AUDIT

Protectowire's manufacturing facility in Hanover, MA is currently included in Factory Mutual's Facilities and Procedures Audit program. The addition of this equipment to the manufacturer's currently Approved product line represented no change to manufacturing or quality control procedures that would require a special audit. The facilities and quality control procedures will continue to be inspected at least annually for as long as this Approval is in effect.

VI MANUFACTURER'S RESPONSIBILITIES

6.1 The manufacturer shall provide instructions for installation, operation, and maintenance with each unit of cable.

6.2 The manufacturer shall advise Factory Mutual of all proposed changes to the material shown in the Documentation List (Appendix) of this report via the Approved Product Revision Report (Form 797).

VII CONCLUSION

The Type EPR linear fire detection cable meets FM requirements. Approval will be effective when the Approval Agreement is signed and received by FM.


ORIGINAL DATA: Project Data Record OZ8A7.AY

ATTACHMENTS: Appendix - Documentation list
System Component - Protectowire Linear Heat Detector
(Form 6592N-695)
"Installing Protectowire Linear Heat Detector" (Form 78771-695)

EXAMINATION AND TESTS BY: P. K. Schoenheiter

REPORT BY:

REVIEWED BY:



P. K. Schoenheiter
Project Engineer
Systems Section -



R. W. Elliott
Assistant Manager
Systems Section

Appendix

DOCUMENTATION LIST

The following documentation is applicable to this Approval and is on file at Factory Mutual. No changes of any nature shall be made unless notice of the proposed change has been given and prior written authorization obtained from FM. The Approved Product-Revision Report FM Form 797, shall be forwarded to Factory Mutual as notice of proposed changes.

<u>DESCRIPTION</u>	<u>DRAWING NO.</u>	<u>REV</u>	<u>DATE</u>
Protectowire Type EPR Composition	DS-9097	—	8/95
Protectowire Line Heat Detector Type-EPR-Outer Jacket Marking	DS-9098	A	3/95
Protectowire Outer Jacket Specifications for Type EPR	DS-9099	—	9/95
Specifications - <u>Protectowire</u> Type EPR	DS-9108		

APPROVAL REPORT

**TYPE EPN AND TYPE EPC (EXTRA HIGH)
LINEAR FIRE DETECTION CABLE
FOR ALARM SIGNALING SYSTEMS**

Prepared For:

**The Protectowire Company, Inc.
P. O. Box A
Hanover, MA 02339**

**J. I. 0W1A9.AY
(3210)
May 24, 1993**



Factory Mutual Research

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Norwood, Massachusetts 02062



Factory Mutual Research

1151 Boston-Providence Turnpike
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J. I. 0W1A9.AY
(3210)

May 28, 1993

TYPE EPN AND TYPE EPC (EXTRA HIGH) LINEAR FIRE DETECTION CABLE FOR ALARM SIGNALING SYSTEMS

from

**The Protectowire Company, Inc.
P. O. Box A
Hanover, MA 02339**

I INTRODUCTION

1.1 The Protectowire Company requested FMRC Approval of their Type EPN linear heat detector cable and one additional temperature rating ("extra high") for the Type EPC linear heat detector cable. Both are used with fire alarm signaling systems; however, the "extra high" EPC and EPN cables are not intended for area coverage and are to be used for proximity detector applications only.

1.2 Type EPC cables were previously examined under FMRC Report 0T0A9.AY. The difference between the previously examined cable and EPN cable is the outer cover material. Type EPC has an extruded PVC cover, while the Type EPN has a black nylon jacket, 0.005 inches thick, over the PVC.

1.3 The following standard was used for the examination and evaluation of the equipment included in this report:

Factory Mutual Research Corporation, Approval Standard - Thermostats for Automatic Fire Detection, Class 3210 (July 1978)

1.4 The Protectowire listing in the Factory Mutual Research Approval Guide under Fire Detection, Heat-Actuated will be revised to read as follows:

Type P, WPP, WFR, EPC, EPN, fixed temperature, heat-sensitive cable for area heat detection. Rated operating temperatures are: regular, 155°F (68°C); intermediate, 190°F (88°C); high, 280°F (138°C). Types EPC and EPN also have an extra high, 356°F (180°C) which is intended for proximity detection only. Rated for 30 Vac, 42 Vdc. Spacing Guide for all but the "extra high" cables: 25 ft. X 25 ft. (7.6m X 7.6m) max.

II DESCRIPTION

2.1 The EPN cable is a line type heat detector comprised of two conductors encased in a heat sensitive material. The conductors are twisted together to impose a spring pressure on them. The conductors are wrapped in a protective Mylar film and the entire cable is PVC jacketed (which can withstand ambient temperatures up to 221°F (105°C)), then covered with a 0.005 inch thick nylon outer jacket. At its rated temperature, the heat sensitive coating on the actuating conductors softens resulting in the conductors coming into electrical contact with each other. The principle of operation and installation requirements are further described in the attached literature.

2.2 The EPN cable is available in four fixed trip temperatures: regular, 155°F (68°C); intermediate, 190°F (88°C); high, 280°F (138°C); and extra high, 356°F (180°C). The extra high is intended to be used as a proximity detector only.

2.3 The inner jacket of the cable is color coded as follows: regular (red); intermediate (white); high (blue); and extra high (red). The outer jacket of all temperature ratings is black.

2.4 The extra high EPC cable is rated at 356°F (180°C) and is similar to the extra high EPN cable, but does not have the black nylon outer jacket.

2.5 All cables are rated for 30 Vac, 42 Vdc.

2.6 The cable is spliced using a splicing connector designated as "PWSC." The suitability of these connectors for outdoor use, and the means for sealing it watertight, have not been evaluated, and therefore outdoor use is not covered by this Approval.

III MARKING

4.1 Tests were conducted at Factory Mutual Research Corporation (FMRC) in Norwood, MA on representative samples of the cables covered by this report. All samples were compared with appropriate drawings and component information supplied by the manufacturer and found to meet FMRC requirements.

4.2 Operational Testing - The EPN and extra high EPC heat detector cable were tested to verify the manufacturer's performance claims and the following FMRC Approval requirements:

4.2.1 Temperature Rating - A sample of each temperature rating was tested and found to operate within 3% of its rated fixed temperature (expressed in °F), when the ambient temperature increased at less than 2°F (1.1°C) per minute.

4.2.2 High Ambient Stability Test - Samples were subjected to a temperature 10% below the rated operating temperature: regular, 140°F (61°C); intermediate, 171°F (80°C); high, 252°F (124°C); and extra high, 320°F (160°C). The test period was a minimum of 24 hours. The cable did not false alarm during the test period.

4.3 Dielectric Tests - A test voltage of 500 volts rms was applied for one minute between the conductors and the outer jacket. No arcing, dielectric breakdown, or leakage current was observed during or at the end of these tests.

4.4 Due to the similarity to cable previously tested under FMRC Report 0T0A9.AY, no further testing was necessary.

V FACILITIES AND PROCEDURES AUDIT

Protectowire's manufacturing facility in Hanover, MA is currently included in FMRC's Facilities and Procedures Audit program. The addition of this equipment to the manufacturer's currently Approved product line represented no change to manufacturing or quality control procedures that would require a special audit. The facilities and quality control procedures will continue to be inspected annually for as long as this Approval is in effect.

VI MANUFACTURER'S RESPONSIBILITIES

6.1 The manufacturer shall provide instructions for installation, operation, and maintenance with each unit of cable.

6.2 The manufacturer shall advise Factory Mutual Research Corporation of all proposed changes to the material shown in the Documentation List (Appendix I) of this report via the Approved Product Revision Report (Form 797).

VII CONCLUSION

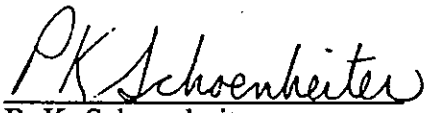
The Type EPN linear fire detection cable and the Type EPC extra high rated linear fire detection cable meet FMRC requirements. Approval will be effective when the Approval Agreement is signed and received by FMRC.

ORIGINAL DATA: Test Notebook No. 93-186

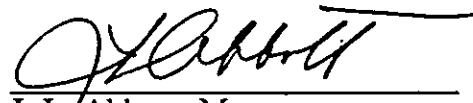
ATTACHMENTS: Appendix I - Documentation list
System Component (Form 6592 K - 1/93)
"Installing Protectowire line heat detector" (Form 7877 G - 3/93)

EXAMINATION AND TESTS BY: P. K. Schoenheiter

REPORT BY:


P. K. Schoenheiter
Project Engineer
Systems Section

REVIEWED BY:


J. L. Abbott, Manager
Systems Section

Appendix I

0W1A9.AY

DOCUMENTATION LIST

<u>DESCRIPTION</u>	<u>DRAWING NO.</u>	<u>REV.</u>	<u>DATE</u>
Protectowire Water/Oil Bath Temperature Control Programming Procedure	Form #8121	---	6/91
PHSC (EPC)/(EPN) Outer Jacket Specifications	DS-8915 H	---	8/92
Protectowire Line Heat Detector Type-EPC-Outer Jacket Marking	DS-8972	B	8/92
Protectowire Composition for Types EPC and Standard	DS-8977	A	9/90
Protectowire Line Heat Detector Type-EPN-Outer Jacket Markings	DS-9019	A	8/92
Protectowire Type EPN Composition	DS-9018	---	9/92

APPROVAL REPORT

**TYPE EPC
LINEAR HEAT DETECTION CABLE
FOR FIRE ALARM SIGNALING SYSTEMS**

Prepared For:

**The Protectowire Company
P. O. Box A
Hanover, MA 02339**

**J.I. 0T0A9.AY
(3210)
October 3, 1990**



Factory Mutual Research

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**Factory Mutual Research**

October 18, 1990

1151 Boston-Providence Turnpike
P.O. Box 9102
Norwood, Massachusetts 02062
Telephone (617) 762-4300
Telex 92-4415The Protectowire Company
P. O. Box A
Hanover, MA 02339

Attn: Mr. William Doherty, Vice President of Engineering

Subject: Approval Examination of Type EPC Linear Heat Detection Cable
Ref. FMRC J.I. OTOA9.AY - Correction

Gentlemen:

Thank you for pointing out the errors in section 1.2 our report. This letter confirms that description of the Type WFR was incorrect and that the description of your "standard construction" cable was omitted. Section 1.2 has been revised as follows:

1.2 The "standard construction", Type P, WPP, WFR cables were previously examined under FMRC Report OE0A9.AY. The difference between the previously examined cables and EPC cable is the outer cover material. The "standard construction" has a cotton braid; Type P has a tape wrap; Type WPP has a tape wrap over asphalt; Type WFR has a fiberglass braid cover over fire retardant tape wrap; Type EPC has an extruded PVC cover.

I have corrected the master copy, so that subsequent copies will be correct. Since the Approval listing is not effected by this change, a revised report will not be issued.

Very truly yours,

Mayo E. Brown, Jr.
Asst. Manager
Systems Sectioncc: TIC 3210 Class File
TIC Serial File

APPROVAL REPORT

TYPE TRI LINEAR HEAT DETECTOR, ZC-95 AND
ZC-95M ZONE CARD MODULES FOR USE WITH
THE FS-2000 SERIES CONTROL PANEL

Prepared For:

The Protectowire Company, Inc.
P.O. Box A
Hanover, MA 02339

J.I. 0B3A1.AY
Class 3210
Date: July 8, 1996

FACTORY MUTUAL



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