

APPROVAL REPORT

Model PHSC-135-XLT linear heat detector

Prepared for:

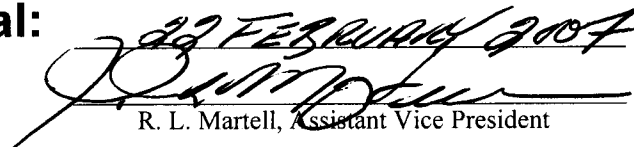
The Protectowire Company, Inc.
40 Grissom Road,
Plymouth, MA 02360

Project ID: 3026472

Class: 3210

Date of Approval:

Authorized by:

22 FEBRUARY 2007

R. L. Martell, Assistant Vice President

Model PHSC-135-XLT linear heat detector

Prepared for:

**The Protectowire Company, Inc.
40 Grissom Road,
Plymouth, MA 02360**

I INTRODUCTION

- 1.1 The Protectowire Company requested an examination of the Model PHSC-135-XLT linear heat detector cable. The linear heat detector as listed in 1.4 was tested for compliance with the standards listed in 1.3.
- 1.2 This Report may be freely reproduced only in its entirety and without modification.
- 1.3 Standards

Title	Class Number	Date
Thermostats for Automatic Fire Detection	3210	July 1978

- 1.4 Listings: The listing for the PHSC Series linear heat detectors in the *Approval Guide*, a publication of FM Approvals under Alarm Signal Initiating Devices, Fire Detection, Heat Actuated will be revised to reflect the addition of Model PHSC-135-XLT linear heat detector cable and highlighted by bold print as follows:

Series PHSC, Types EPC, EPN, **XLT** and EPR fixed temperature heat-sensitive cable for area heat detection. Rated operating temperatures are: **extra low, 135°F (57°C) (Type XLT only)**; regular, 155°F (68°C); intermediate, 190°F (88°C), 220°F (105°C) (Type EPC only); 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. All models rated for 30 V ac, 42 Vdc. Spacing guide for the 220°F (105 °C) and 280°F (138°C) cables: 25 × 25 ft (7.6 × 7.6 m). In addition, spacing guide for the models **PHSC-135-XLT**, PHSC-155-EPN, PHSC-190-EPN, PHSC-155-EPC, PHSC-155-EPR, PHSC-190-EPC and PHSC-190-EPR cables: 30 × 30 ft (9.1 m × 9.1 m). “Extra high” cables are not intended for area coverage.

- 1.5 The scope of this report is limited to the addition of the subject linear heat detector to the current Approval Guide Listing.

II DESCRIPTION

The Model PHSC-135-XLT Linear Heat Detector Cable is a new model within the currently Approved Protectowire family of heat detectors. It uses the same construction techniques and procedures as the previously Approved EPC family linear heat detectors (FM Approvals Report ID: 3019465), but is designed for lower alarm temperature [135°F (57°C)]. The Model PHSC-135-XLT sensor cable is comprised of two steel conductors individually insulated with a heat sensitive polymer. The insulated conductors are twisted together to impose a spring pressure between them, then wrapped with a protective tape and finished with an outer jacket suitable for the environment in which the detector will be installed. This detector is therefore capable of initiating an alarm once its rated activation temperature of 135°F (57°C) is reached. At the rated

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temperature, the heat sensitive polymer insulation yields to the pressure upon it, permitting the inner conductors to move into contact with each other thereby initiating an alarm signal. This action takes place at the first heated point anywhere along the detectors length. It does not require a specific length to be heated in order to initiate an alarm nor is system calibration necessary to compensate for changes in the installed ambient temperature. The principal of operation and installation requirements are further described in the manufacturer's literature.

III EXAMINATIONS AND TESTS

- 3.1 A sample length of Model PHSC-135-XLT Linear Heat Detection Cable was examined and tested at the FM Approvals facilities in Norwood, MA & West Gloucester, RI, and at the Protectowire facility in Hanover, MA. Examination showed the sample was constructed in accordance with the manufacturer's specifications.
- 3.2 **Operational tests-** Samples of the Model PHSC-135-XLT were subjected to heat sensor testing. All tests were conducted with a 12Vdc continuity tester, with the exception of the voltage variation testing.
- 3.2.1 **Actuation Set point Temperature-** Representative samples of the detector cable was subjected to ambient temperature increases of less than 2°F/minute (1.1°C/minute). Each sample operated within 3% in °F of its rated value 135°F (57°C). This is acceptable.
- 3.2.2 **High Ambient Stability Test-** Representative samples of the detector cable was subjected to a temperature 10% below the 135°F (57°C) fixed operating temperature, or 121.5°F (50 °C). The detectors did not false alarm during the 24-hour test period. This is acceptable.
- 3.2.3 **Heat Detector "Listed Spacing"** A heat detector is required by FM Approvals Standard, Thermostats For Automatic Fire Detection, Class 3210 (Section 2.4) to "operate as quickly as a comparably rated automatic sprinkler on a 10 feet by 10 feet (3.1 m by 3.1 m) spacing when exposed to the same heat conditions. A maximum spacing guide figure is determined by the tests." The heat source was a heptane torch fire sized to operate the automatic sprinkler in approximately two minutes. The sprinkler was placed on a smooth ceiling, positioned on a simulated 10 foot (3.2 m) spacing [7 feet (2.2 m) from the fire center].
- 3.2.3.1 The responses of the models PHSC-135-XLT heat detectors installed at 30 ft × 30 ft (9.1 m × 9.1 m) spacing were compared to a respectively rated Approved 135°F (57°C) automatic sprinklers. The sprinkler was installed at 10 ft x 10 ft (3.1 m by 3.1 m) spacing. The detector tested consistently went into alarm prior to or simultaneously with the operation of the automatic sprinkler.
- 3.2.3.2 The results of this test show that the models PHSC-135-XLT linear heat detector meets the 30 by 30 ft (9.1 m by 9.1 m) maximum spacing.
- 3.3 **Voltage Variations** - Normal system operation was verified over an operating voltage range between 85% and 110% of nominal voltage. A nominal voltage of 42 Vdc results in a range of 35.7 V dc – 46.2 V dc, and a nominal 30Vac results in a 25.5Vac -33Vac voltage range. There was no significant change in operating temperature at the extremes of either voltage range. This is acceptable.
- 3.4 **Environmental Conditioning** – One 10 m (33 ft) long sample of the cable was conditioned a minimum of sixteen hours at each ambient temperature of -60°F (-57°C) and 125 °F (52°C), and

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twenty four hours at an ambient of 100°F (38°C) and 90% relative humidity. The cable operated properly when tested for normal operation before and after each exposure.

- 3.5 **Vibration Test** – One 1 m (3.3 ft) sample of the cable was subjected to vibration testing conducted by subjecting the equipment to vertical vibration for four hours with a total displacement of 0.02 inches (0.5 mm) and a frequency sweep of 10 – 30 – 10 Hz at two cycles per minute while the cable was connected to the test equipment. There were no loose or broken parts, nor were there any false alarms.
- 3.6 **Dielectric Test** - A dielectric test was conducted on a representative sample length (1m) of cable. A test voltage of 500 V ac was applied for one minute between the sensor connection leads (shorted together) and the cable's conductive foil. A test voltage of 500 V ac was applied for one minute between the sensor connection leads. No arcing, dielectric breakdown or leakage current was observed during or at the end of these tests.

IV MARKING

The following information appears on the equipment described in Section 2 and as shown on attached Linear Heat Detector Type XLT Marking drawing DS-8972 revision G:

- Manufacturer's name
- Model Number
- Fixed trip temperature rating
- The FM Approvals mark
- Batch code identifying the detector means of traceability

V REMARKS

Installations shall comply with the manufacturer's instruction manual.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site in Plymouth, MA is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURER'S RESPONSIBILITIES

- 7.1 As part of the listing requirements, FM Approvals requires assurance that subsequent systems produced will present the same quality and reliability as the system examined. The manufacturer shall maintain a Quality Assurance Program, which includes as a minimum: incoming, in-process, and final inspection and testing; equipment calibration; and drawing change control. The specific procedures used to control quality are best determined by the manufacturer.
- 7.2 The manufacturer shall provide installation, operating, and maintenance manual(s) with each system.

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7.3 Documentation considered critical to this Approval is on file at FM Approvals and listed in the Documentation File, Section VIII of this report. No changes of any nature shall be implemented unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product Revision Report, Form 797, shall be forwarded to FM Approvals as notice of proposed changes.

VIII DOCUMENTATION

The following drawings describe the Model PHSC-135-XLT Linear Heat Detection Cable and are filed under Project I.D. 3026472.

Drawing No	Revision	Drawing Title
DS-6592T	T	Linear Heat Detector Data Sheet
DS-8972	G	Line heat detector Type EPC/XLT Markings
DS-7877P	P	Installation Instructions

IX CONCLUSION

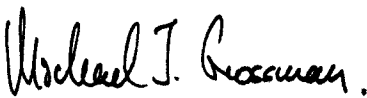
The equipment described in section 1.4 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

EXAMINATION AND TESTING BY: M. Grossman

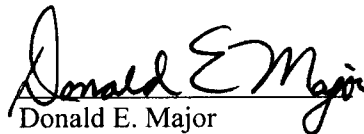
PROJECT DATA RECORD: 3026472

ATTACHMENTS: P/N DS-8972, Rev. G, "Line heat detector Type EPC/XLT Markings".

REPORT BY:


Michael J. Grossman
Senior Engineer
Electrical Systems

REPORT REVIEWED BY:


Donald E. Major
Technical Team Manager
Electrical Systems

UL MARK FOR CANADA

MODEL NO.

TEMPERATURE RATINGS AND CLASSIFICATION COLOR CODING

COMPANY NAME

TYPE OF DEVICE

FACTORY MUTUAL MARK

EXTRUDED PLASTIC COVERING (PVC)

FIXED (TRIP) TEMP.

UNDERWRITERS LABORATORIES INC. MARKING

(57°C)

135°F Regular (ORD.) - ORANGE

UL LISTED 931G cUL

(68°C)

155°F Regular (ORD.) - RED

UL LISTED 931G cUL

(88°C)

190°F Intermediate - WHITE

UL LISTED 931G cUL

(105°C)

220°F Intermediate+ - BLACK

or GRAY

(138°C)

280°F High - BLUE

UL LISTED 931G cUL

(180°C)

356°F EXTRA HIGH - LT. BLUE

or RED

UL LISTED 931G cUL

LETTERING SIZE 0.062" HIGH MIN.

MARKINGS TO REPEAT EVERY 24" MIN.

USING CONTRASTING INKS.

PROTECTOWIRE

PROTECTOWIRE LINE HEAT DETECTOR
PVC TYPE-OUTER JACKET MARKING

F	1/12/04	DEL FRENCH	ADD 220
G	2/6/06	ADD	135

A	9/20/92	SIZE WAS 0.063"	DWN	W.F.D.
B	8/4/92	ADD EX. HI. TEMP.	DATE	9-10-90
C	5/7/92	ADD UL MARKING	APPD.	<i>[Signature]</i>
D	11/3/93	UL CANADA MARK	DWG NO	931G
E	1/14/94	ADD FRENCH WORDING	REV.	DS 8972 G

THE PROTECTOWIRE CO. INC.
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