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APPROVAL REPORT

MODEL H8040N LINEAR HEAT SENSOR CABLE

Prepared For:

Brand-Rex Limited
Leigh, Lancashire, England WN7 4HB

3008933

(3220)

Date: September 8, 2000

FACTORY MUTUAL



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

FACTORY MUTUAL



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P.O. Box 9102
Norwood, MA 02062

**3008933
(3220)**

September 8, 2000

MODEL H8040N LINEAR HEAT SENSOR CABLE

from

**Brand-Rex Limited
Leigh, Lancashire
ENGLAND WN7 4HB**

I INTRODUCTION

1.1 Brand-Rex Limited requested an Approval examination of their Model H8040N linear heat sensor cable. The H8040N is similar to the Model H8040 which was previously examined and Approved under Factory Mutual Research Reports 0F5A0.AY, 0M8A3.AY, 0Q8A9.AY, and 3003834. This cable is also similar to the Model H8045N which was previously examined and Approved under Factory Mutual Research report 3008312.

1.2 This version of the Model H8040 cable has a coating of Nylon 12, instead of the braid. It was determined that basic operational testing would be required to verify the actuation temperature of this new linear heat sensor cable.

1.3 This Approval is based on examination and tests to the applicable performance and safety requirements of the following standard:

**Factory Mutual Research Approval Standard 3210 (7/78)
Thermostats for Automatic Fire Detection**

1.4 The Brand-Rex Limited Model H8040N linear heat sensor cable will be added to the existing listing in the Factory Mutual Research Approval Guide as shown in Appendix II.

II DESCRIPTION

2.1 The manufacturer has made available the necessary specifications which have been examined and are retained on file at Factory Mutual Research.

2.2 Since the previous Approval of the Model H8040 linear heat sensor cable, the manufacturer has added the option of another coating. In addition to the former braided coating, the cable now can have a coating of Nylon 12 and is designated H8045N.

2.3 There have been no other changes to the cable.

III MARKING

The H8040N cable is shipped with a label containing the manufacturer's name and address, cable temperature rating, type designation, and the Factory Mutual Research Approval symbol. The H8040N cable is black in color with H8040N printed on the cable.

IV EXAMINATION AND TESTS

- 4.1 Sample lengths of the Model H8040N linear heat sensor cable, representative of production, were examined and tested at Factory Mutual Research in Norwood, MA. All technical data is on file at Factory Mutual Research along with other documents and correspondence applicable to this program.
- 4.2 **Temperature Rating** - Samples of the H8040N cable responded to temperatures within the required +/- 3% of rated temperature when ambient temperature was increased at a rate of less than 2°F (1.1°C) per minute. The average response temperature was 153.1°F (67°C) which is acceptable for this 145-158°F (63-70°C) rated cable.
- 4.3 **High Ambient Stability Test** - A sample of the H8040N cable was subjected to a temperature 10% below the rated operating temperature. The test temperature was 137°F (58°C) for this cable. The test period was 48 hours, and the cable did not false alarm during the test period.
- 4.4 **Dielectric Test**. Test voltages of 500 V rms and 710 V dc were applied between the conductors and the outer jacket. No arcing or dielectric breakdown occurred during these tests of one minute each.
- 4.5 Because of testing done previously on the Model H8040 linear heat sensor cable, no further tests were necessary.

V MANUFACTURER'S RESPONSIBILITIES

- 5.1 The manufacturer shall continue to provide instructions for installation and maintenance with each shipment of cable.
- 5.2 The manufacturer shall continue to advise Factory Mutual Research of all proposed changes to the material shown in the Documentation List of this report via the Approved Product Revision Report (Form 797).

VI FACILITIES AND PROCEDURES AUDIT

The Brand-Rex Limited manufacturing facility in Leigh, Lancashire, England is currently included in the Factory Mutual Research Facilities and Procedures Audit program. The changes to this product represented no change to manufacturing or quality control procedures that would require a special audit. These audits will continue for as long as this Approval remains in effect.

VII CONCLUSION

The Brand-Rex Limited Model H8040N linear heat sensor cable meets Factory Mutual Research requirements. Approval will be in effect when the Approval Agreement is signed and a copy received by Factory Mutual Research.

ATTACHMENTS: Appendix I - Documentation List
 Appendix II - Approval Guide Listing

ORIGINAL DATA: Project Data Record 3008933

EXAMINATIONS AND TESTS BY: P. K. Schoenheiter

REPORT BY:

PK Schoenheiter

P. K. Schoenheiter
Project Engineer
Systems Section

REPORT REVIEWED BY:

R. W. Elliott

R. W. Elliott
Manager
Systems Section

Appendix I

DOCUMENTATION LIST

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

<u>Drawing No.</u>	<u>Description</u>	<u>Revision</u>
HPCS 9243	Constructional Specification, page 1 of 16	Issue No. 6
HPCS 9243	Constructional Specification, page 2	Issue No. 4
HPCS 9243	Constructional Specification, page 9A	Issue No. 1

Appendix II

(Note: changes to previous listing are shown in **bold**)

APPROVAL GUIDE LISTING

Line Type Heat Sensing Cable. Cable Type H8028 operates at 220°F (105°C); H8040 and **H8040N operates operate** at 145-158°F (63-70°C); H8045 and H8045N operate at 180°F (82°C); H8069 operates at 350°F (177°C); and H9650 operates at 452°F (233°C). Each cable is a continuous line type open circuit detector that shorts when in an alarm condition. Cable H8028 is suitable for outdoor use. Accessories for installing the cable include Thomas & Betts Model TC5375 standoff support/cable ties, Model TC88 routing clamp, Model TC5345A or TC5347A mounting base plus cable ties and Scotchlok Communication Model U1R cable connectors. Max rating for all cables is 1 A, 110 V dc. Spacing guide: parallel cable runs should not be more than 20 ft (6 m) apart. Note: the Types H8069 and H9650 are intended for proximity detection only.

APPROVAL REPORT

MODEL H8045N LINEAR HEAT SENSOR CABLE

Prepared For:

Brand-Rex Limited
Leigh, Lancashire, England WN7 4HB

3008312
(3220)
Date: August 7, 2000

FACTORY MUTUAL



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

3008312
(3220)

August 7, 2000

MODEL H8045N LINEAR HEAT SENSOR CABLE

from

**Brand-Rex Limited
Leigh, Lancashire
ENGLAND WN7 4HB**

I INTRODUCTION

1.1 Brand-Rex Limited requested an Approval examination of their Model H8045N linear heat sensor cable. The H8045N is similar to the Model H8045 which was previously examined and Approved under Factory Mutual Research Reports 3005155 and 3006776. This cable is also similar to the Model H8040 which was previously examined and Approved under Factory Mutual Research reports 0F5A0.AY, 0M8A3.AY, and 0Q8A9.AY.

1.2 This version of the Model H8045 cable has a coating of Nylon 12, instead of the braid. It was determined that basic operational testing would be required to verify the actuation temperature of this new linear heat sensor cable.

1.3 This Approval is based on examination and tests to the applicable performance and safety requirements of the following standard:

**Factory Mutual Research Approval Standard 3210 (7/78)
Thermostats for Automatic Fire Detection**

1.4 The Brand-Rex Limited Model H8045N linear heat sensor cable will be added to the existing listing in the Factory Mutual Research Approval Guide as shown in Appendix II.

II DESCRIPTION

2.1 The manufacturer has made available the necessary specifications which have been examined and are retained on file at Factory Mutual Research.

2.2 Since the previous Approval of the Model H8045 linear heat sensor cable, the manufacturer has added the option of another coating. In addition to the former braided coating, the cable now can have a coating of Nylon 12 and is designated H8045N.

2.3 There have been no other changes to the cable.

III MARKING

The H8045N cable is shipped with a label containing the manufacturer's name and address, cable temperature rating, type designation, and the Factory Mutual Research Approval symbol. The H8045N cable is black in color with H8045N printed on the cable.

IV EXAMINATION AND TESTS

4.1 Sample lengths of the Model H8045N linear heat sensor cable, representative of production, were examined and tested at Factory Mutual Research in Norwood, MA. All technical data is on file at Factory Mutual Research along with other documents and correspondence applicable to this program.

4.2 Temperature Rating - Samples of the H8045N cable responded to temperatures within the required +/- 3% of rated temperature when ambient temperature was increased at a rate of less than 2°F (1.1°C) per minute. The average response temperature was 186.6°F (86°C) which is acceptable for this 180°F (82°C) rated cable.

4.3 High Ambient Stability Test - A sample of the H8045N cable was subjected to a temperature 10% below the rated operating temperature, 162°F (72°C) for this 180°F (82°C) rated cable. The test period was 44½ hours, and the cable did not false alarm during the test period.

4.4 Dielectric Test. Test voltages of 500 V rms and 710 V dc were applied between the conductors and the outer jacket. No arcing or dielectric breakdown occurred during these tests of one minute each.

4.5 Because of testing done previously on the Model H8045 linear heat sensor cable, no further tests were necessary.

V MANUFACTURER'S RESPONSIBILITIES

5.1 The manufacturer shall continue to provide instructions for installation and maintenance with each shipment of cable.

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

VI FACILITIES AND PROCEDURES AUDIT

The Brand-Rex Limited manufacturing facility in Leigh, Lancashire, England is currently included in the Factory Mutual Research Facilities and Procedures Audit program. The changes to this product represented no change to manufacturing or quality control procedures that would require a special audit. These audits will continue for as long as this Approval remains in effect.

VII CONCLUSION

The Brand-Rex Limited Model H8045N linear heat sensor cable meets Factory Mutual Research requirements. Approval will be in effect when the Approval Agreement is signed and a copy received by Factory Mutual Research.

ATTACHMENTS: Appendix I - Documentation List
 Appendix II - Approval Guide Listing

ORIGINAL DATA: Project Data Record 3008312

EXAMINATIONS AND TESTS BY: P. K. Schoenheiter

REPORT BY:

REPORT REVIEWED BY:

PK Schoenheiter

P. K. Schoenheiter
Project Engineer

R. W. Elliott

R. W. Elliott
Manager, Systems Section

Appendix I

DOCUMENTATION LIST

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

<u>Drawing No.</u>	<u>Description</u>	<u>Revision</u>
HPCS 9243	Constructional Specification, page 1 of 16	Issue No. 6
HPCS 9243	Constructional Specification, page 2	Issue No. 4
HPCS 9243	Constructional Specification, page 9A	Issue No. 1

Appendix II

(Note: changes to previous listing are shown in **bold**)

APPROVAL GUIDE LISTING

Line Type Heat Sensing Cable. Cable Type H8028 operates at 220°F (105°C); H8040 operates at **145-158°F (63-70°C)**; H8045 and H8045N ~~operates~~ **operate** at 180°F (82°C); H8069 operates at 350°F (177°C); and H9650 operates at 452°F (233°C). Each cable is a continuous line type open circuit detector that shorts when in an alarm condition. Cable H8028 is suitable for outdoor use. Accessories for installing the cable include Thomas & Betts Model TC5375 standoff support/cable ties, Model TC58 routing clamp, Model TC5345A or TC5347A mounting base plus cable ties and Scotchlok Communication Model U1R cable connectors. Max rating for all cables is 1 A, 110 V dc. Spacing guide: parallel cable runs should not be more than 20 ft (6 m) apart. Note: the Types H8069 and H9650 are intended for proximity detection only.

APPROVAL REPORT

MODIFICATIONS TO H8040 LINEAR HEAT SENSOR CABLE

Prepared For:

BICC Brand-Rex Limited
Leigh, Lancashire, England WN7 4HB

3003834

(3220)

Date: August 9, 1999

FACTORY MUTUAL



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

3003834
(3220)

August 9, 1999

MODIFICATIONS TO H8040 LINEAR HEAT SENSOR CABLE

from

**BICC Brand-Rex Limited
Leigh, Lancashire
ENGLAND WN7 4HB**

I INTRODUCTION

1.1 BICC Brand-Rex Limited requested an Approval examination of the modifications made to the Model H8040 linear heat sensor cable. The Model H8040 was previously examined and Approved under FMRC Reports 0F5A0.AY, 0M8A3.AY, and 0Q8A9.AY.

1.2 Changes in the manufacturer's specification for the Model H8040 cable were submitted for review. It was determined that basic operational testing would be required to verify the actuation temperature of this linear heat sensor cable.

1.3 This Approval is based on examination and tests to the applicable performance and safety requirements of the following standard:

FMRC Standard 3210 (7/78) Thermostats for Automatic Fire Detection

1.4 The existing listing for the BICC Brand-Rex Limited Model H8040 linear heat sensor cable in the Factory Mutual Research Approval Guide will be modified as shown in the Appendix.

II DESCRIPTION

2.1 The manufacturer has made available the necessary specifications which have been examined and are retained on file at Factory Mutual Research Corporation.

2.2 Review of the documentation showed that the EVA insulation material had changed, resulting in a smaller diameter of cable.

2.3 There have been no other changes to the cable.

III MARKING

The H8040 cable continues to be shipped with a label containing the manufacturer's name and address, cable temperature rating, type designation, and the Factory Mutual Research Approval symbol. The

H8040 cable is color coded red with a green stripe.

IV EXAMINATION AND TESTS

4.1 Sample lengths of the Model H8040 linear heat sensor cable, representative of production, were examined and tested at Factory Mutual Research Corporation in Norwood, MA. All technical data is on file at FMRC along with other documents and correspondence applicable to this program.

4.2 **Temperature Rating** - Samples of the cable responded to temperatures within the required +/- 3% of rated temperature when ambient temperature was increased at a rate of less than 2°F (1.1°C) per minute.

4.3 **High Ambient Stability Test** - A sample of the cable was subjected to a temperature 10% below the rated operating temperature, 130°F (55°C) for the 145°F (62°C) rated cable. The test period was 68 hours, and the cable did not false alarm during the test period.

4.4 **Dielectric Test.** Test voltages of 500 V rms and 500 V dc were applied between the conductors and the outer jacket. No arcing or dielectric breakdown occurred during these tests of one minute each.

4.5 Because of testing done previously on the Model H8040 linear heat sensor cable, no further tests were necessary.

V MANUFACTURER'S RESPONSIBILITIES

5.1 The manufacturer shall continue to provide instructions for installation and maintenance with each shipment of cable.

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

VI FACILITIES AND PROCEDURES AUDIT

The BICC Brand-Rex Limited manufacturing facility in Leigh, Lancashire, England is currently included in FMRC's Facilities and Procedures Audit program. The changes to this product represented no change to manufacturing or quality control procedures that would require a special audit. These FMRC audits will continue for as long as this Approval remains in effect.

VII CONCLUSION

The BICC Brand-Rex Limited Model H8040 linear heat sensor cable continues to meet Factory Mutual Research Corporation requirements. Approval will continue to be in effect when the Approval Agreement is signed and a copy received by FMRC.

ATTACHMENTS: Appendix I - FMRC Approval Guide Listing

Appendix II - Documentation List

ORIGINAL DATA: Project Data Record 3003834

EXAMINATIONS AND TESTS BY: P. K. Schoenheiter

REPORT BY:

REPORT REVIEWED BY:

PK Schoenheiter

P. K. Schoenheiter
Project Engineer

R. W. Elliott

R. W. Elliott
Manager, Systems Section

Appendix I

FMRC Approval Guide Listing

(Note: changes to present listing are shown in **bold**)

ALARM SIGNAL INITIATING DEVICES, FIRE DETECTION, HEAT-ACTUATED

Line Type Heat Sensing Cable. Cable Type H8028 operates at 220°F (105°C); H8040 operates at **140-149°F (60-65°C)**. Each cable is a continuous line type open circuit detector that shorts when in an alarm condition. Cable H8028 is suitable for outdoor use. Accessories for installing the cable include Thomas & Betts Model TC5375 standoff support/cable ties, Model TC88 routing clamp, Model TC5345A or TC5347A mounting base plus cable ties and Scotchlok Communication Model U1R cable connectors. Max rating for all cables is 1 A, 110 V dc. Spacing guide: parallel cable runs should not be more than 20 ft (6 m) apart.

Appendix II

DOCUMENTATION LIST

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

<u>Drawing No.</u>	<u>Description</u>	<u>Revision</u>
HPCS 9243	Constructional Specification	Issue 3, Amend.3

NOT to be distributed outside FM Global, except by CLIENT.

APPROVAL REPORT

MODELS H8045, H8069, and H9650 LINEAR HEAT SENSOR CABLE

Prepared For:

BICC Brand-Rex Limited
Leigh, Lancashire, England WN7 4HB

3005155

(3220)

Date: November 24, 1999

FACTORY MUTUAL



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

3005155
(3220)

November 24, 1999

MODELS H8045, H8069, and H9650 LINEAR HEAT SENSOR CABLE

from

**BICC Brand-Rex Limited
Leigh, Lancashire
ENGLAND WN7 4HB**

I INTRODUCTION

1.1 BICC Brand-Rex Limited requested an Approval examination of their Models H8045, H8069, and H9650 linear heat sensor cable. These versions are similar to the Model H8040 which was previously examined and Approved under Factory Mutual Research reports 0F5A0.AY, 0M8A3.AY, and 0Q8A9.AY.

1.2 Manufacturer's specifications for the Models H8045, H8069, and H9650 cables were submitted for review. It was determined that basic operational testing would be required to verify the actuation temperature of these linear heat sensor cables.

1.3 This Approval is based on examination and tests to the applicable performance and safety requirements of the following standard:

FMRC Standard 3210 (7/78) Thermostats for Automatic Fire Detection

1.4 The listing for the BICC Brand-Rex Limited linear heat sensor cables in the Factory Mutual Research Approval Guide will be expanded to include these new models as shown in Appendix I.

II DESCRIPTION

2.1 The manufacturer has made available the necessary specifications which have been examined and are retained on file at Factory Mutual Research.

2.2 The H8045 cable is used for area protection with a maximum spacing of 20 ft. (6 m) between parallel cable runs. The Models H8069 and H9650 cables are used for proximity detection only.

2.3 The maximum bending radius of these cables is 5 in. (12.7 cm).

III MARKING

The H8045, H8069, and H9650 cables are shipped with a label containing the manufacturer's name and address, cable temperature rating, type designation, and the Factory Mutual Research Approval symbol.

The H8045 cable (180°F, 82°C) is color coded red with a black stripe; the H8069 (350°F, 177°C) is color coded red; and the H9650 (452°F, 233°C) is color coded white.

IV EXAMINATION AND TESTS

4.1 Sample lengths of the Model H8045, H8069, and H9650 linear heat sensor cables, representative of production, were examined and tested at Factory Mutual Research in Norwood, MA. All technical data is on file at Factory Mutual Research along with other documents and correspondence applicable to this program.

4.2 **Temperature Rating** - Samples of the cable responded to temperatures within the required +/- 3% of rated temperature when ambient temperature was increased at a rate of less than 2°F (1.1°C) per minute.

4.2.1 The H8045 cable responded at an average temperature of 180°F (82°C).

4.2.2 The H8069 cable responded at an average temperature of 350°F (177°C).

4.2.3 The H9650 cable responded at an average temperature of 452°F (233°C).

4.3 **High Ambient Stability Test** - A sample of the cable was subjected to a temperature 10% below the rated operating temperature, 162°F (72°C) for the H8045 cable; 315°F (157°C) for the H8069; and 407°F (208°C) for the H9650. The test period was at least 24 hours in all cases, and the cables did not false alarm during the test period.

4.4 **Dielectric Test.** Test voltages of 500 V rms and 500 V dc were applied between the conductors tied together and the outer jacket; and also between the two conductors only. No arcing or dielectric breakdown occurred during these tests of one minute each.

4.5 Because of testing done previously on the Model H8040 linear heat sensor cable, no further tests were necessary.

V MANUFACTURER'S RESPONSIBILITIES

5.1 The manufacturer shall continue to provide instructions for installation and maintenance with each shipment of cable.

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

VI FACILITIES AND PROCEDURES AUDIT

The BICC Brand-Rex Limited manufacturing facility in Leigh, Lancashire, England is currently included in the Factory Mutual Research Facilities and Procedures Audit program. The changes to this product represented no change to manufacturing or quality control procedures that would require a special audit. These audits will continue for as long as this Approval remains in effect.

VII CONCLUSION

The BICC Brand-Rex Limited Models H8045, H8069, and H9650 linear heat sensor cables meet Factory Mutual Research requirements. Approval will be effective when the Approval Agreement is signed and a copy received by Factory Mutual Research.

ATTACHMENTS: Appendix I - Factory Mutual Research Approval Guide Listing
 Appendix II - Documentation List

ORIGINAL DATA: Project Data Record 3005155

EXAMINATIONS AND TESTS BY: P. K. Schoenheiter

REPORT BY:

PK Schoenheiter

P. K. Schoenheiter
Project Engineer

REPORT REVIEWED BY:

R.W. Elliott

R. W. Elliott
Manager, Systems Section

Appendix I

Factory Mutual Research Approval Guide Listing

(Note: changes to present listing are shown in **bold**)

ALARM SIGNAL INITIATING DEVICES, FIRE DETECTION, HEAT-ACTUATED

Line Type Heat Sensing Cable. Cable Type H8028 operates at 220°F (105°C); H8040 operates at 140-149°F (60-65°C); **H8045 operates at 180°F (82°C); H8069 operates at 350°F (177°C); and H9650 operates at 452°F (233°C)**. Each cable is a continuous line type open circuit detector that shorts when in an alarm condition. Cable H8028 is suitable for outdoor use. Accessories for installing the cable include Thomas & Betts Model TC5375 standoff support/cable ties, Model TC88 routing clamp, Model TC5345A or TC5347A mounting base plus cable ties and Scotchlok Communication Model U1R cable connectors. Max rating for all cables is 1 A, 110 V dc. Spacing guide: parallel cable runs should not be more than 20 ft (6 m) apart. **Note: the Types H8069 and H9650 are intended for proximity detection only.**

Appendix II

DOCUMENTATION LIST

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

<u>Drawing No.</u>	<u>Description</u>	<u>Revision</u>
HPCS 9243	Constructional Specification	Issue 4, June 29, 1999