

Not to be distributed outside of FM Approvals and its affiliates except by Customer

# APPROVAL REPORT

**MODELS 27120-12, 27120-22, 27121-20, 28020-3,  
28021-5, 27120-0, 27121-0, 28020-0, AND 28021-0 FIRE  
DETECTION HEAT DETECTORS  
FOR USE IN HAZARDOUS (CLASSIFIED) LOCATIONS  
(PRODUCT REVISIONS)**

## Prepared For:

**Kidde-Fenwal, Inc.  
400 Main Street  
Ashland, MA 01721**

**Project ID: 3041110**

**Supplements: 1C4A6.AE**

**Class: 3211**

**Date of Approval: 30 March 2011**

**Authorized by:**



J.E. Marquedant, Group Manager, Electrical

## I INTRODUCTION

- 1.1 Kidde-Fenwal, Inc. (manufacturer) requested FM Approval of their Detect-A-Fire (DAF), Fire Detection Heat Detectors as explosionproof for use in Class I, Division 1, Groups B, C, and D; Dust-Ignitionproof for Class II, Division 1, Groups E, F, and G; and Class III, Division 1 Hazardous (Classified) Locations. This report adds a modified construction to the DAF Detectors. The existing FM Approved design includes a non metallic cement material located at the male threaded entry to the detector. The modified construction addressed in this report controls a glass to metal seal at the male threaded entry, removing the required control of the nonmetallic material previously required to maintain the Explosionproof and dust Ignitionproof protection.
- 1.2 This report supplements the original FM Approval report, 1C4A6.AE dated March 21, 1979, and all subsequent FM Approval reports and processed Revision Reports. This report may be reproduced only in its entirety and without modification.
- 1.3 **Listing:** The DAF Detectors listing will remain unchanged as a result of this program. The current listing can be found in the *Fire Protection* division of the *FM Approval Guide*, an online publication of FM Approvals LLC.
- 1.4 **Standards:** The equipment described by this report was shown to comply with the applicable requirements of the following standards.

<u>Title</u>	<u>Author-Number</u>	<u>Date</u>
Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements.	FM Class - 3600	1998
Explosionproof Electrical Equipment General Requirements.	FM Class - 3615	2006

- 1.6 As described by this report, the construction of the subject equipment provides the degree of protection against electrical shock, fire and injury required for hazardous (classified) locations. Installation shall be in accordance with the manufacturer's instructions and the National Electrical Code.

## II DESCRIPTION

- 2.1 The construction of the DAF Detectors remains unchanged except from the modified construction seal controlled at the male threaded entry. The original controlled entry included a non metallic potting material. This controlled potting material has been removed as a controlled joint material and has been replaced by controlling a glass to metal seal located in the entry. This modification changes the design control of the entry from a potted entry to a glass to metal seal. All other joints and design construction of the DAF Detectors is the same and still applicable and satisfactory to the FM Approval.
- 2.2 The DAF Detectors are available in varies configurations for connection and temperature. The DAF Detectors are available in high temperature and low temperature, each of which can be installed in the standard manner with the thread on the opposite side of the device body or in the inverted mount where the thread is located on the same side of the head as the device body. The ends of the DAF Detectors are sealed with a weld.

FM APPROVALS  
Project ID: 304I110

- 2.3 The DAF Detectors require mounting using a suitable junction box and fittings rated for hazardous (classified) locations.

### III EXAMINATION AND TEST

- 3.1 **General** – Samples of the DAF Detectors considered to be representative of production models were submitted for examination and testing. The samples included two low temperature standard detectors, two low temperature inverted detectors, two high temperature standard detectors, and two high temperature inverted detectors. Each set of two consisted of an open entry and an open detector to allow for suitable pressure testing in both the inward and outward direction of the sealed entry. Tests were conducted at FM Approvals' facility in West Glocester, RI. Testing required for this product modification were impact, internal hydrostatic, and external hydrostatic testing. All other previous testing as described in FM Approvals Project 1C4A6.AE, supplemental project 0V3H0.AE, and all other subsequent revision reports are still applicable. All data is on file at FM Approvals along with other documents and correspondence applicable to this program.
- 3.2 **Flameproof Joint Analysis** – The DAF Detectors' modification includes the controlling of a glass to metal seal in the male threaded entry in placement or the previously tested and controlled cemented entry. The modified entry is a glass to metal seal with a minimum glass thickness 0.187 inches (4.75 mm). The glass to metal seal is made of 304, or 316, stainless steel and Corning 9013 glass. This is satisfactory.
- 3.3 **Impact Test** - The DAF Detector samples were subjected to an impact with a 2.7 Joule magnitude. The impact was obtained by dropping a 1kg weight with a 25 mm hemispherical hardened steel head falling from the required minimum distance to produce the impact energy onto the NPT fitting of the respective samples. Results were satisfactory in that no damage occurred to the sample that would impair its ability to pass the follow up hydrostatic testing identified below.
- 3.4 **Hydrostatic Testing** - A hydrostatic test was conducted on one of each of the pair of samples of the DAF Detectors. The test pressure was equal to at least 400% of the maximum measured ignition pressure of 175 psi (1,206 kPa) determined in 1C4A6.AE and applied to the inside of the DAF Detector's glass to metal seal. The pressure was increased at a rate no less than 100 psi/min and held at a minimum test pressure of 700 psi (4,826 kPa) for one minute. No leakage or visible permanent deformation occurred to the samples. This is satisfactory.
- 3.5 **Hydrostatic Testing** - A hydrostatic test was conducted on the other of each of the pair of samples of the DAF Detectors. The test pressure was equal to at least 6,000 psi (41,368 kPa) and was applied to the outside of the DAF Detector's glass to metal seal. The pressure was increased at a rate no less than 100 psi/min and held for one minute. No leakage or visible permanent deformation occurred to the samples. This is satisfactory for a factory seal.

### IV MARKINGS

The DAF Detectors are provided with an aluminum nameplate that is press fit over the male NPT fitting of the devices. The nameplate markings include the manufacturer's name and address along with the rated current and voltage are marked on the product. The model number,

FM APPROVALS  
Project ID: 3041110

manufacturing date code, and temperature setting are permanently stamped onto the male NPT fitting of the DAF Detectors where they are visible after installation.

**V REMARKS**

Installations shall comply with the relevant requirements of the National Electrical Code® (ANSI/NFPA 70) and the manufacturer's instruction manual.

**VI FACILITIES AND PROCEDURES AUDIT**

The DAF Detectors, design and manufacturing are controlled by Kidde-Fenwal, Inc. and are manufactured at the Ashland, MA facility. This facility is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture the product tested and Approved.

**VII MANUFACTURER'S RESPONSIBILITIES**

7.1 The manufacturer shall advise FM Approvals of all proposed changes to the documentation file in Section VIII. No changes of any nature shall be made unless notice of the proposed change has been given and written authorization obtained from FM Approvals. The Approved Product - Revision Report, FM Approvals Form 797, shall be forwarded to FM Approvals as notice of proposed changes.

7.2 On 100% of production, the DAF Detectors shall be dielectric tested. A test voltage potential of 1,000 Vac or 1414 Vdc shall be applied between the input leads tied together and the metallic enclosure casing for one minute with no occurrence of insulation breakdown. Alternatively, test potentials 20% higher may be applied for at least one second.

**WARNING:** The dielectric test required may present a hazard of injury to personnel and/or property and should only be performed under controlled conditions, and by persons knowledgeable of the potential hazards of such testing to minimize the likelihood of shock and/or fire.

7.3 On 100% of production, the manufacturer shall continue to stamp the model number, manufacturing date code, and temperature setting on the DAF Detectors where it is visible after installation.

**VIII DOCUMENTATION FILE**

The DAF Detectors were originally tested and certified under FM Approval Project 1C4A6.AE, and controlled drawings and documentation were maintained at FM Approvals under 1C4A6.AE. The DAF Detectors were subjected to a supplemental FM Approval Project 0V3H0.AE, and controlled drawings and documentation were maintained at FM Approvals under 0V3H0.AE. These drawing under 0V3H0.AE should have been originally controlled under 1C4A6.AE since the project was a supplement to the original FM Approval. As a result of updating the controlled drawing and documentation package during this project, the controlled drawings and documentation under 0V3H0.AE will be moved to be controlled under 1C4A6.AE. The

FM APPROVALS  
Project ID: 3041110

following documentation is applicable to this equipment and is on file at FM Approvals, reference Blueprint File 1C4A6.AE. Documents identified with an asterisk (\*) and highlighted are directly related to this program and the DAF Detectors and were added to provided detailed construction and certification criteria to the controlled documentation list.

<u>Drawing</u>	<u>Revision</u>	<u>Title</u>	<u>Report</u>
00-9202XX-XXX	BF	LEAD WIRE PTFE, 250C, #16, 600V	9/3/02
06-118323-00X	AA	THERMOFIT ADHESIVE SLEEVE	9/3/02
*06-127371-00X	BB	ASSY HEADER	3041110
*06-127372-002	BD	ASSY – ELEMENT (REGULAR COMPRESSION)	3041110
*06-127373-002	BD	ASSY – ELEMENT (INVERSE COMPRESSION)	3041110
*06-128769-001	BD	ASSY – ELEMENT (INVERSE COMPRESSION)	3041110
*06-130406-000	ND	NAMEPLATE	3041110
*06-130406-100	CD	NAMEPLATE	3041110
*06-131072-000	BA	HEAD	3041110
*06-131337-000	AD	HEAD – HEX COUPLING	3041110
*06-133184-000	FD	NAMEPLATE	3041110
*06-133184-100	CD (was CB)	NAMEPLATE	3041110
*06-139215-00X	BD	HEAD - HEX	3041110
*06-230845-001	CA	HEAD - HEX	3041110
*06-231814-001	BF	HEADER	3041110
06-232697-001	XC	DETECT-A-FIRE (HEAT DETECTOR)	0V3H0.AE
*06-233022-000	BB	NAMEPLATE	3041110
*06-233022-100	CD	NAMEPLATE	3041110
12.01.B	12/92	INSTALLATION INSTRUCTIONS	0V3H0.AE
*12-E27120-000-0T	BA	DETECT-A-FIRE	3041110
*12-E27121-000-0T	BA	DETECT-A-FIRE	3041110
*12-E27121-020-0T	BA	DETECT-A-FIRE	3041110
12-E27121-071	AB	DETECT-A-FIRE	09/24/04
12-E27121-072	AB	DETECT-A-FIRE	09/24/04
*12-E27121-13000-0T	BA	DETECT-A-FIRE (140°F, FLOUROCARBON COATING)	3041110
*12-E27121-23000-0T	BA	DETECT-A-FIRE (160°F, FLOUROCARBON COATING)	3041110
*12-E27121-31024-0T	BA	DETECT-A-FIRE (190°F, EXTENDED LEAD WIRE)	3041110
*12-E27121-33000-0T	BA	DETECT-A-FIRE (190°F, FLOUROCARBON COATING)	3041110
*12-E27121-51024-0T	BA	DETECT-A-FIRE (225°F, EXTENDED LEAD WIRE)	3041110
*12-E27121-53000-0T	BA	DETECT-A-FIRE (225°F, FLOUROCARBON COATING)	3041110
*12-E28020-003-0T	BA	DETECT-A-FIRE	3041110
*12-E28021-005-0T	BA	DETECT-A-FIRE	3041110
*12-E28021-25000-0T	BA	DETECT-A-FIRE (160°F, CONTROL SET POINT)	3041110
*12-E28021-33000-0T	BA	DETECT-A-FIRE (190°F, FLOUROCARBON COATING)	3041110
*12-E28021-53000-0T	BA	DETECT-A-FIRE (225°F, FLOUROCARBON COATING)	3041110
*12-E28021-55000-0T	BA	DETECT-A-FIRE (225°F, CONTROL SET POINT)	3041110
*12-F27120-000-0T	BA	DETECT-A-FIRE	3041110
*12-F27121-000-0T	BA	DETECT-A-FIRE	3041110
*12-F27121-020-0T	BA	DETECT-A-FIRE	3041110
*12-F27121-12012-0T	BA	DETECT-A-FIRE	3041110
*12-F27121-23000-0T	BA	DETECT-A-FIRE (325°F, FLOUROCARBON COATING)	3041110

FM APPROVALS  
Project ID: 3041110

*12-F27121-33000-0T	BA	DETECT-A-FIRE (360°F, FLOUROCARBON COATING)	3041110
*12-F28020-003-0T	BA	DETECT-A-FIRE	3041110
*12-F28021-005-0T	BA	DETECT-A-FIRE	3041110
*12-F28021-12012-0T	BA	DETECT-A-FIRE	3041110
*12-F28021-13000-0T	AA	DETECT-A-FIRE (275°F, FLOUROCARBON COATING)	3041110
*12-F28021-15000-0T	BA	DETECT-A-FIRE (275°F, CONTROL SET POINT)	3041110
*12-F28021-23000-0T	AA	DETECT-A-FIRE (325°F, FLOUROCARBON COATING)	3041110
*12-F28021-33000-0T	BA	DETECT-A-FIRE (360°F, FLOUROCARBON COATING)	3041110
*12-G27120-022-0T	BA	DETECT-A-FIRE	3041110
*12-G27121-000-0T	BA	DETECT-A-FIRE	3041110
*12-G27121-020-0T	BA	DETECT-A-FIRE	3041110
*12-G27121-11012-0T	BA	DETECT-A-FIRE	3041110
*12-G27121-12012-0T	BA	DETECT-A-FIRE	3041110
*12-G28020-003-0T	BA	DETECT-A-FIRE	3041110
*12-G28021-005-0T	BA	DETECT-A-FIRE	3041110
*12-G28021-13000-0T	BA	DETECT-A-FIRE (450°F, FLOUROCARBON COATING)	3041110
*12-G28021-15000-0T	BA	DETECT-A-FIRE (450°F, CONTROL SET POINT)	3041110
*12-H27121-000-0T	BA	DETECT-A-FIRE	3041110
*12-H27121-020-0T	BA	DETECT-A-FIRE	3041110
*12-H28021-005-0T	BA	DETECT-A-FIRE	3041110
*TF-28020-003-0T	AA	DETECT-A-FIRE	3041110
*TF-E28020-003-0T	BA	DETECT-A-FIRE	3041110
*TF-G27121-000-0T	BA	DETECT-A-FIRE	3041110

**IX CONCLUSION**

The DAF Detectors, as described in this report, meet FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

**TESTING AND EXAMINATION BY:**

S. Bichan (FM Approvals)  
R. Lawrence (FM Approvals)  
R. Pimentel (FM Approvals)

**PROJECT DATA RECORD: 3041110**

**REPORT BY:**

*Scott W. Bichan*

\_\_\_\_\_  
Scott W. Bichan  
Engineer  
Hazardous Locations

**REPORT REVIEWED BY:**

*Andrew Lozinski*

\_\_\_\_\_  
Andrew Lozinski  
Technical Team Manager  
Hazardous Locations