VESDA-E VEA

Commissioning Guide

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Document Conventions

The following typographic conventions are used in this document:

Convention	Description
Bold	**Used to denote:** emphasis. Used for names of menus, menu options, toolbar buttons
Italics	**Used to denote:** references to other parts of this document or other documents. Used for the result of an action.

The following icons are used in this document:

Convention	Description
	**Caution:** This icon is used to indicate that there is a danger to equipment. The danger could be loss of data, physical damage, or permanent corruption of configuration details.
	**Warning:** This icon is used to indicate that there is a danger of electric shock. This may lead to death or permanent injury.
	**Warning:** This icon is used to indicate that there is a danger of inhaling dangerous substances. This may lead to death or permanent injury.

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Codes and Standards Information for Air Sampling Smoke Detection

We strongly recommend that this document is read in conjunction with the appropriate local codes and standards for smoke detection and electrical connections. This document contains generic product information and some sections may not comply with all local codes and standards. In these cases, the local codes and standards must take precedence. The information below was correct at time of printing but may now be out of date, check with your local codes, standards and listings for the current restrictions.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, the user is encouraged to try to correct the interference by one or more of the following measures; re-orientate or relocate the receiving antenna, increase the separation between the equipment and receiver, connect the equipment to a power outlet which is on a different power circuit to the receiver or consult the dealer or an experienced radio/television technician for help.

FDA

This VESDA product incorporates a laser device and is classified as a Class 1 laser product that complies with FDA regulations 21 CFR 1040.10. The laser is housed in a sealed detector chamber and contains no serviceable parts. The laser emits invisible light and can be hazardous if viewed with the naked eye. Under no circumstances should the detector chamber be opened.

FM Hazardous Applications

3611 Hazardous Approval Warning: Exposure to some chemicals may degrade the sealing of relays used on the detector. Relays used on the detector are marked “TX2-5V”, “G6S-2-5V” or “EC2-5NU”.

VESDA detectors must not be connected or disconnected to a PC while the equipment is powered in an FM Division 2 hazardous (classified) location (defined by FM 3611).

FM Approved Applications

The product must be powered from VPS-100US-120 or VPS-100US-220 only.

ONORM F3014

ONORM F3014, transport times for all tubes (including capillaries) must not exceed 60 seconds from any hole. This means that the pre-designed pipe networks that include capillaries cannot be used.

AS1603.8

The performance of this product is dependent upon the configuration of the pipe network. Any extensions or modifications to the pipe network may cause the product to stop working correctly. You must check that ASPIRE2 approves alterations before making any changes. ASPIRE2 is available from your VESDA ASD distributor.

AS1851.1 2005

Maintenance Standards. Wherever this document and the AS1851.1 differ, AS1851.1 should be followed in preference to this document.

European Installations

The product must use a power supply conforming to EN54: Part 4.

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Contents

Scope

The VESDA-E VEA Commissioning Guide outlines the commissioning process for the VESDA-E VEA detector. It will guide you through the commission process and the completion of commissioning documentation. The guide also provides information on the approval and handover of commissioned VESDA-E VEA detectors.

The Commissioning Guide helps with the commissioning and management of the VESDA-E VEA detector.

This guide assumes that you have attended accredited VESDA training on commissioning and are knowledgeable about the VESDA product range. This guide also assumes that you have an understanding of the various aspects of an aspirating smoke detection system and are fully aware of the local codes and standards.

To commission the VESDA-E VEA detector, you must have the necessary certification issued by Xtralis or an authorized distributor. Commissioning before you receive the appropriate training may void the warranty.

1 Introduction to VESDA-E VEA Commissioning

Commissioning is the final stage of the system installation. It forges together the elements of designing and installing the tubes, installing the detector(s), cabling for power and communications, and the powering up of the detector. The objective and outcome of the commissioning process is to provide a fully functional VESDA-E VEA detector that matches local code requirements and customer specification.

2 The Commissioning Process

The commissioning process is a step-by-step process designed to systematically check and validate all the operational aspects of the VESDA-E VEA detector. The process benchmarks the performance levels tailored for each site and generates the necessary documentation for the effective management and maintenance of the detector. The following sections describe the steps required in typical commissioning.

2.1 Pre-Commissioning (before going to site)

Prior to starting the commissioning process, the commissioning engineer should study any design and installation considerations for the site. Properly maintained tube network design and installation records should assist in providing most of the information. Ensure that the following documents are available:

- The site layout plans
- The "as installed" drawings for the site
- Tube network design records
- Tube network installation record
- Relevant product and installation guides (VEA-040-A00 and VEA-040-A10 product guides (documents # 27034 and 27035 respectively), VESDA-E VEA Installation Sheet (Document # 27679))
- VESDA-E VEA commissioning form
- Other forms as required by the local codes and standards
- A USB cable and PC/Laptop with Xtralis VSC software to configure and commission the detector
- Material for conducting acceptable smoke test

You must be aware of the local codes and standards as applicable to the customer site.

2.2 Pre-Commissioning (on site)

Before commencing with the commissioning, check the electrical and interface cabling for the detector. Ensure that all electrical wiring is securely terminated maintaining the correct polarity. The product guides contain the details on how to correctly wire the detector. The detector should be connected to a power source supplying 24 VDC.

Caution!

VESDA-E VEA detector will not operate when the supply is reversed. Operating the VEA detector when DC supply voltage is outside the voltage range of 18 VDC and 30 VDC may cause damage to the device.

Please check that all electrical installations meet the requirements of local electrical codes and standards.

- Ensure that actual installed tubes match the design and the installation records including the combination of 6mm and 4mm tubes designed using Microbore Tube Length Calculator (document #29261).
- Please follow the instructions mentioned in VESDA-E VEA Intallation Sheet, document #27679, for VEA detector mounting.
- Ensure that you have at least 0.5m distance from the detector to any object around it allowing for smooth access for tubes.
- Ensure that all tube ends at the VEA detector inlets are properly cut using the VEA tube cutter supplied with the VEA detector with cutter blade held perpendicular to the tube.
- Insert tubes one by one into the VEA inlets while keeping a record of the mapping between the tube sampling point location and the tube number. Ensure that each tube is fully secured inside the inlet to avoid any leakage.
- Power up the VEA detector and carry out the initial system checks as described in the relevant product guide.

2.3 Configuration

Connect Xtralis VSC software to VEA and carry out the configuration as described in the relevant product guide.

Note: Display of certain features and options on Xtralis VSC software depends on VEA firmware version; certain features are not available on VEA firmware below 5.30. Xtralis recommends upgrading the VEA detector firmware to 5.30 or later. Please contact your local Xtralis Field Application Engineer for the latest VEA firmware.

Important to note that the steps below cover the main functions required to commission and start using the detector. Refer to the relevant product guides for the detailed step-by-step instructions and VSC software screens, the steps below are to act as reminders on commissioning process and do not replace the product guide steps.

1. Set the network time to match the time and date of your computer.
2. Ensure that **General**, **VESDAnet**, **Ethernet** and **WiFi** tabs are filled with the proper information.
3. Confirm that the serial number displayed in Xtralis VSC is the same as the serial number on the detector's cover.
4. Ensure that the **Module** tab is configured adequately for number of tubes and tube lengths as well as the sample points.

   Note: Inputting incorrect length that does not match actual length will cause the detector flow readings to be out of expected range and the detector may have trouble normalizing.
5. Ensure that the **Smoke Threshold** information is entered correctly. Pay particular attention to Sensitivity and set Alert according to the site background conditions.
6. Ensure that the **Air Flow** information is entered correctly. Pay particular attention to Periodic Airflow Testing, set these parameters based on the site conditions.
7. Ensure that **Relays**, **Button Lockout** and **Logging** screens are configured adequately for the site conditions.

   Note: Make sure to click the Apply button to save the configuration into the VEA detector.

To record the detector's configuration either print it using VSC or record in Annex A: VESDA-E VEA Configuration Record. To print the configuration select the detector on VSC tree view at left and choose the **Print** command on the File menu.

3 NFPA72 Code Compliance

3.1 NFPA72 Requirements

VESDA-E VEA is classified as an Aspirating Smoke Detection (ASD) product and it complies with NFPA72 Initial Acceptance and Annual testing requirements with minimal testing. With full supervision and automated centralized tests, VEA verifies end to end system operation continuously and automatically performs system integrity tests at set times and at much shorter intervals than the annual period required by NFPA72.

The below sections are taken from the NFPA72 2013 edition.

14.2.8 Automated Testing

14.2.8.1 Automated testing arrangements that provide equivalent means of testing devices to those specified in Table 14.4.3.2 at a frequency at least equivalent to those specified in Table 14.4.3.2 shall be permitted to be used to comply with the requirements of this chapter.

Table 14.4.3.2 *Continued*

Component	Initial Acceptance	Periodic Frequency	Method
(4) Air sampling	X	Annually	Test with smoke or a listed and labeled product acceptable to the manufacturer or in accordance with their published instructions. Test from the end sampling port or point on each pipe run. Verify airflow through all other ports or points.

14.2.8.2 Failure of a device on an automated test shall result in an audible and visual trouble signal.

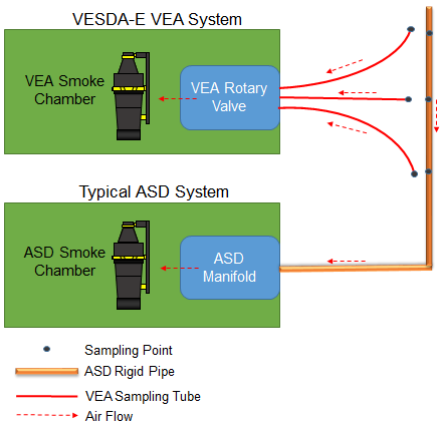
14.2.9 Performance-Based Inspection and Testing

As an alternate means of compliance, subject to the authority having jurisdiction, components and systems shall be permitted to be inspected and tested under a performance-based program.

Explanation of VEA being an Air Sampling Detector (ASD):

VESDA-E VEA is an ASD system like any other.

The figure above represents the two types of ASD and shows that VEA is an ASD system that works in the same way as the other ASD systems:



- ASD using rigid orange pipes: each pipe can have multiple sampling holes that transfers smoke to a centralized smoke chamber through a manifold. Hence the sample air entering the smoke chamber is combined from all the sampling holes from individual pipes.
- VESDA-E VEA ASD using tubes: an ASD that has a tube for each sampling hole, smoke is transferred from all these holes to a centralized smoke chamber through a manifold in the rotary valve. Hence the sample air entering the smoke chamber is combined from all the sampling points connected to individual tubes.

So both ASD systems work exactly in the same way; the same rules apply to both the systems.

In addition:

- VEA continuously monitors airflow from each sampling point to detect clogged/broken tubes or sample points meeting NFPA72 Table 14.4.3.2 Air Sampling requirement of verification of airflow.
- Full supervision of sampling port and microbore tube at set intervals much shorter than annual requirement in NFPA72.
- End to end system integrity monitoring allows centralized smoke test (to test smoke chamber) which Xtralis recommends to test during commissioning and at the time of annual maintenance.

4 Commissioning Tests

4.1 Initial Tests

1. Run a Flow Scan to the detector. Select the detector, right click it then select **Device** and **click Start Flow Scan Base**. This process might take 35 minutes.
2. Generate a log file with all the available data. Check the airflow values in the event log for each tube as shown in the example below.

8/26/2016 2:35:4	2219	Notify	Flow Scan Completed. Source: Detector
8/26/2016 2:35:4	2218	Notify	Flow Tube 20: 0.70 L/min
8/26/2016 2:35:4	2217	Notify	Flow: 127.6%. Source: Tube 20
8/26/2016 2:35:4	2216	Notify	Flow Tube 19: 0.65 L/min
8/26/2016 2:35:4	2215	Notify	Flow: 176.8%. Source: Tube 19
8/26/2016 2:35:1	2214	Notify	Flow Tube 18: 0.88 L/min
8/26/2016 2:35:1	2213	Notify	Flow: 158.1%. Source: Tube 18
8/26/2016 2:35:1	2212	Notify	Flow Tube 17: 0.58 L/min
8/26/2016 2:35:1	2211	Notify	Flow: 157.7%. Source: Tube 17
8/26/2016 2:34:3	2210	Notify	Flow Scan Started. Tubes 17 to 20. Source: Detector

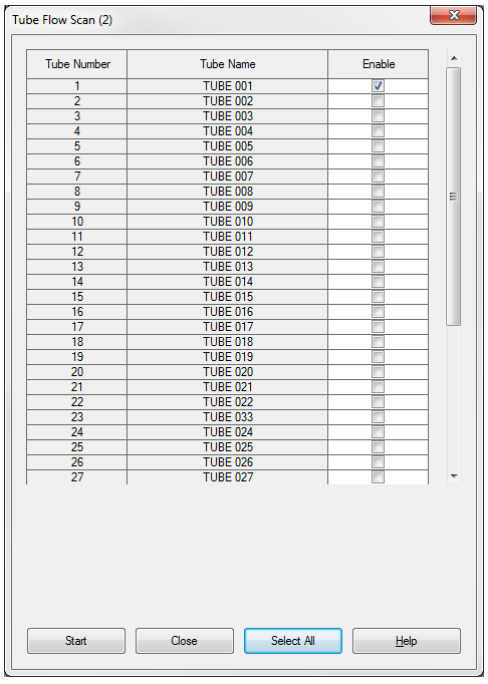
- Values must be in range of 0.3 – 0.90 liter/minute depending on the site condition.
- Values less than 0.3 l/m: Check tube blockage.
- Values more than 0.90 l/m: Check tube/ connector leakage.

Note: Ensure that all the tubes are of correct length including when the combination is used with 4mm and 6mm tubes, incorrect tube lengths may cause faulty flow values.

3. Record the tubes with both high and low flow values for further debugging. It is recommended to attempt the fixes for all high or low flow value tubes at the same time and then use the Tube Flow Scan function.

Note: The tube flow scan allows you to select specific tube(s) and do a quick flow measurement. Note that tube flow scan is only used for debugging where the flow may be too high or too low.

To run a tube flow scan, select **Tube Flow Scan** from the **Device** Menu, then tick the tubes for which the tube flow scan is to be done and select **Start**. “Testing In Progress” will be displayed. The detector will move the rotary valve to each tube and measure the flow rate. The event log will have an event showing the flow rate for each selected tube.



Note: Tube flow scan is only available in VEA firmware 5.30 or above, for previous firmware Flow Scan is the only mechanism available to do the flow measurement.

It is recommended that each time only one fix is applied per tube to minimize the debugging time.

Tips:

- High flow values are generally caused due to leakage or shorter tube compared to other tubes. To fix the high flow follow the steps below and perform Tube Flow Scan for the relevant tubes:
  - Ensure that the inserted length for the tube in the **Module** tab matches the actual length
  - Ensure that the tube end is cut properly at the detector inlet end
  - Ensure that the tube is inserted all the way in to the detector inlet
  - Block the tube completely at the sample point end and ensure zero flow when tube flow scan is performed
  - Ensure no leakage at any change over point wherever tube connectors are used
- Low flow values are generally caused due to blockage or longer tube compared to other tubes. To fix the low flow follow the steps below and perform Tube Flow Scan for the relevant tubes:
  - Ensure that the tube end is cut properly at the detector inlet end
  - Ensure that the tube is not bent or squeezed at any point in its entire length
  - Open the tube completely at the sample point end and ensure higher flow when tube flow scan is performed
  - Ensure no mishandling at any change over point wherever tube connectors are used
- It is crucial to do single fix at a time for each tube and then run the Tube Flow Scan, under no circumstances you should remove all tubes at the same time.
- If the firmware version is older than 5.30 and has not been upgraded yet, you will need to do a complete Flow Scan to fix the tube problems.

4. Once all tubes flows are within acceptable range normalize the detector. This process might take 35 minutes.

   Note: This step is done after all tubes have been properly fixed and all flow values are within acceptable range.

5. Once the detector is normalized, print the flow and pressure by selecting the **detector → Device → Print Flow and Pressure**, save to text file and keep a date-stamped physical copy with the commissioning records.

4.2 Functional Tests

Before running the following functional tests, make sure that the detector is free from errors.

Refer to the relevant product guide for performing the below tests:

1. Perform **Sampling Point Tests** on all sample points to ensure their correct functioning, replace / repair if the test fails.

   Note: If a sampling point fails the test it must be rectified first otherwise the fault remains in the detector till a power cycle is performed.

2. Test the relay using **Start Alarm Test** or **Start Relay Test** commands
3. Test any ancillary device if present.
4. Record results in the commissioning forms

4.3 Smoke Tests

Smoke tests are required to meet the local codes and standards requirement, how VESDA-E VEA meets the NFPA 72 requirements is described in section 4 of this document.

1. Perform the local smoke test using **Start Local Smoke Test** command and then complete the test using "Stop Local Smoke Test" command. This test checks the correct functioning of the smoke sensor module.
2. Perform a transport time test for the longest even and odd tubes by putting abnormal amount of smoke at their respective sample points and record the transport time when VEA raises a global alarm.

This step satisfies NFPA 72 smoke test requirement of testing longest tube on an ASD system. It is not necessary to test every sampling point for smoke test as explained in section 3. Ensure that the transport time is within the limits specified in VESDA-E VEA Installation Sheet (Document # 27679), reproduced below:

Transport time is determined by the length of the microbore tubes used on the detector. There is no provision for the user to adjust the transport time and there is no tube modelling tool required for VEA.

The transport time is given in the table below for various tube lengths.

Maximum Tube Length	Longest Transport Time
30m [98ft]	40 seconds
40m [131ft]	46 seconds
50m [164ft]	53 seconds
60m [197ft]	60 seconds
70m [230ft]	67 seconds
80m [262ft]	74 seconds
90m [295ft]	82 seconds
100m [328ft]	90 seconds

3. If any specific performance test is required by the local authority having jurisdiction, design an appropriate test in consultation with Xtralis.

4.4 Walk Test

The Walk test function allows the user to quickly perform a smoke test for a selected series of sampling points. Using Walk Test to perform a smoke test on a number of tubes is faster than using the detector's normal operating mode. Walk test on a VEA is similar to a fire panel walk test when each sampling point is required to be smoke tested.

When VEA is protecting many individual physically separated locations Walk test is recommended during commissioning to ensure that sample points are correctly mapped to the VEA tubes. This is a one time process and does not need to be repeated until the mapping between the sampling points and the tubes is changed. As an example if the VEA tubes are configured as shown in the table below, it is important to ensure that when there is smoke event in either Office 1 or other sampling point locations it is correctly reported. Walk test is the only way to ensure that this mapping is correct and sampling point location and tube numbers are not mixed up. For instance, during Walk test if smoke is entered in to Office 1 sampling point and if VEA raises alarm for Tube 2 it is clear that the mapping of Tube 1 to Office 1 sampling point is wrong.

Tube Number	Tube Name
1	Office 1
2	Office 2
3	Meeting room 1
4	Office 3
5	Office 4
6	Meeting room 2
7	Board room
8	Reception

On the other hand if a VEA is protecting single large open space where addressability is not important Walk test is optional and Smoke Test in section 4.2 may be sufficient.

Refer to the relevant product guide on how to perform this test.

Note: Walk test is only available in VEA firmware 5.30 or above, for previous firmware smoke test under normal operation is the only mechanism available to ensure correct tube number to sampling point location mapping.

Annex A: VESDA-E VEA Configuration Record

General Tab	
Network Name	
Location	
Serial Number	
Address (VESDAnet Zone)	

VESDAnet Tab	
Preferred Port	
Loop open ended	Y / N
Status update interval	

Ethernet Tab	
Automatically obtain IP address	Y / N
IP Address	
Subnet mask	
Default gateway	

WiFi Tab	
WiFi Enabled (Y/N)	Y / N
Access Point SSID	
IP Address	
Subnet mask	
Default gateway	

Module Tab				
	No. of Tubes	Tube Length	Relay	Sampling Point
Detector			Y / N	Y / N
Exp Stax-1			Y / N	Y / N
Exp Stax-2			Y / N	Y / N

Smoke Threshold Tab	
Day / Night Sensitivity	
Alert Threshold	
Delay	
Work Days	
Day/Night C/O Enabled Day and Night Start	Y / N
Holidays Enabled Start and End	Y / N

Air Flow Tab	
Fault Sensitivity	
Flow Fault Delay	
Time of Day of Flow Scan	
Flow Scan	
Sampling Point Test	
Sampling Point Cleaning	

Filter Tab	
Service Interval Days	

General Purpose Input Tab	
Unmonitored GPI Function	
Monitored GPI Function	

Relays Tab			
Function	Main Board Relay Number	Latching	Normally Energised
Fire 2		Y / N	Y / N
Fire 1		Y / N	Y / N
Action		Y / N	Y / N
Alert		Y / N	Y / N
Urgent Fault		Y / N	Y / N
Minor Fault		Y / N	Y / N
Disable		Y / N	Y / N
Standby		Y / N	Y / N
Walk Test		Y / N	Y / N

Logging Tab	
Smoke Level Logging	
Flow Logging	
Smoke Level Reporting	

Button Lockout Tab	
Silence (Y/N)	
Reset (Y/N)	
Disable (Y/N)	
Detector Disable Reminder (Y/N)	

Tube Tab (TN = Tube Number, GF = Group Factor)					
TN	Tube Name	GF	TN	Tube Name	GF
1			61		
2			61		
3			63		
4			64		
5			65		
6			66		
7			67		
8			68		
9			69		
10			70		
11			71		
12			72		
13			73		
14			74		
15			75		
16			76		
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46			106		
47			107		
48			108		
49			109		
50			110		
51			111		
52			112		
53			113		
54			114		
55			115		
56			116		
57			117		
58			118		
59			119		
60			120		

ANNEX B: VESDA-E VEA Commissioning Form

Customer Name	
Site Name and Address	
Installer (Name & Contact)	
Commissioning Engineer (Name & Contact)	
Commissioner / AHJ (Name & Contact)	

	Commissioning Checks	Done (Y/N)	Notes
1.	Correct maximum tube length configured		
2.	VESDAnet zone configured		
3.	Smoke alarm thresholds configured		
4.	Periodic airflow testing configured		
5.	Filter service interval days configured Filter replacement due date:		
6.	Tube names and correct group factors configured		
7.	GPI connected and tested (if used)		
8.	Button lockout configured		
9.	Detector normalised and running without faults Print Pressure and Flow used and printed		
10.	The alarm and fault relay outputs are wired to the fire panel		
11.	Test the detector's relay outputs connection to the fire panel using VSC Relay test command Relays 1 to 7 tested		
12.	(If used) Test the VEA relay module stax's relay outputs connection to the fire panel using VSC Relay test command Tubes 1 to 40 relays tested Tubes 41 to 80 relays tested Tubes 81 to 120 relays tested		
13.	Sampling points tested using Xtralis VSC Sampling		

	Point tests command Tubes 1 to 40 sampling points tested Tubes 41 to 80 sampling points tested Tubes 81 to 120 sampling points tested		
14.	Smoke tests done Smoke Type used: Detector local Test Ports tested (If used) Stax-1 local Test Ports tested (If used) Stax-2 local Test Ports tested		
15.	Transport time (TT) tests done Detector longest even and odd pipes TT (If used) Stax-1 longest even and odd TT (If used) Stax-2 longest even and odd TT		
16.	(If required) Specific performance test Reference to performance test document: Detector performance test (If used) Stax-1 performance test done (If used) Stax-2 performance test done		
17.	Walk test done and report generated and printed		
18.	Reset detector – Detector running with no faults?		

Handover: Commissioning engineer, commissioner / AHJ and customer representative should be satisfied on all aspects of commissioning and agree that the commissioning has met the required codes and standards. The detector must be ready for day to day operation prior to hand over. To hand over the system to the client obtain the relevant signatures and ensure that all required documents are included.

Handover Document	
1. Copy of this form 2. Pressure and Flow report printout 3. Configuration printout or record 4. (If done) Specific performance test report 5. Forms required for compliance with local codes and standards	Y / N Y / N Y / N Y / N Y / N

Comments (if any)_____

_____

_____

_____

Accepting Customer Signature **Name:**	Date:
Commissioning Engineer Signature	Date:
Commissioner / AHJ Signature	Date:

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