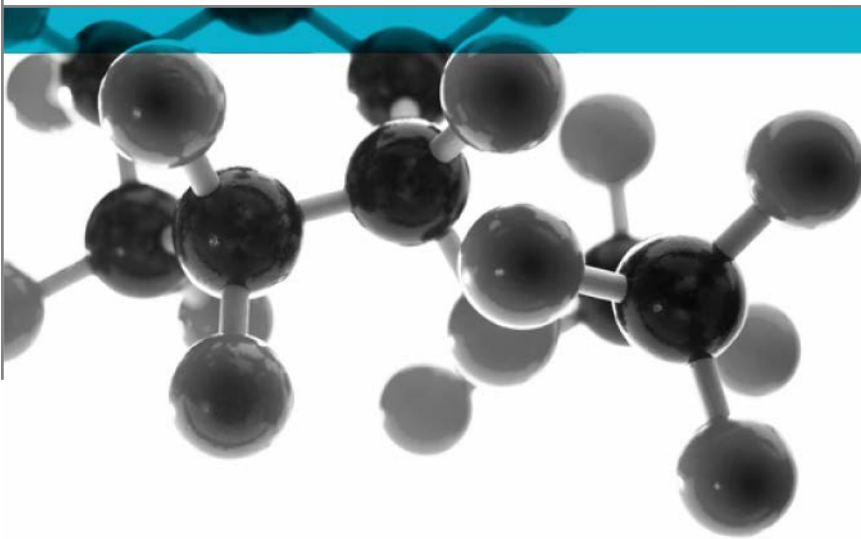


Ad-hoc tests on watermist systems utilising the principles of the procedure defined in Draft BS 8458: 2014: Annex B



Method for Measuring the Capability of a Watermist System to Control a Fire – “Room Fire Test for Watermist Systems with Automatic Nozzles”

A Report To: Plumis

Document Reference: 358547

Date: 24th November 2015

Issue No.: 1

Page 1

Testing
Advising
Assuring

Executive Summary

Objective To evaluate the fire suppression performance of a personal protection (mobile) system with a 5 nozzle spray head utilising the principles of the test procedure defined in Draft BS 8458: 2014: Annex B

Generic Description	Product reference	Thickness / diameter / angle	Weight per unit area / density / total capacity
"Automist Personal Protection System" fire suppression system	"Automist Personal Protection System"	Not applicable	Not applicable
Individual components used to manufacture the system:			
Nozzle	"Production Automist PPS with 5 nozzle biased head"	5 nozzle wall head (PPS_X06) with 2 nozzles at an angle of 79° from the centreline and another 2 nozzles at 45° from centreline and 1 nozzle aligned with centreline	Not applicable
Pipe	"Production High Pressure Stainless Steel pipe 1/4" BSP (PPS_X08)"	Internal: Ø ¼" (6.4mm) External: Ø 13.72mm	7.87g/m ³
Pump	"Production Pluvia Pump"	Not applicable	Not applicable
Water container	"PPS_T01"	Not applicable	67 litres
Heat alarm	"Ei164 Heat Alarm"	Not applicable	Not applicable
Please see page 5 of this test report for the full description of the system tested			

Test Sponsor Plumis, HMS President (1918), Victoria Embankment, London, EC4Y 0HJ

Test Results:

Thermocouple location		Maximum temperature °C	
		Test 1	Test 2
75mm below the underside of the ceiling		799	69
Ceiling temperature – 6.5mm above the underside of the ceiling		163	36
1.6m above the floor, furthest from fire		233	59
1.6m above the floor, centre (if applicable)		280	N/A
1.6m above the floor, close to fire		227	51
Replicated third nozzle		N/A	56
'Tree 1', furthest from fire	600mm (above the floor)	45	N/A
	1200mm (above the floor)	60	N/A
	1600mm (above the floor)	253	N/A
	1800mm (above the floor)	291	N/A
	2300mm (above the floor)	323	N/A
'Tree 2', close to fire	600mm (above the floor)	51	N/A
	1200mm (above the floor)	70	N/A
	1600mm (above the floor)	244	N/A
	1800mm (above the floor)	271	N/A
	2300mm (above the floor)	437	N/A



Key:

Test 1 – Room corner using 'free burn' without any suppression system and 1 plywood sheet per wall.

Test 2 – Room corner test.

Date of Test 5th February and 1st July 2015

Signatories

	
Responsible Officer T. Kinder * Technical Officer	Authorised T. Mort * Senior Technical Officer

* For and on behalf of **Exova Warringtonfire**.

Report Issued: 24th November 2015

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Test Details

Purpose of test	<p>To evaluate the fire suppression performance of a personal protection (mobile) system with a 5 nozzle spray head utilising the principles of the test procedure defined in Draft BS 8458: 2014: Annex B: 2014 "Code of practice for design and installation" Annex B "Room fire test for watermist systems with automatic nozzles".</p> <p>The tests were performed in accordance with the procedure specified in Draft BS 8458: 2014: Annex B and should be read in conjunction with that Standard.</p>
Deviation from test standard	<p>Draft BS 8458: 2014 Annex B.4 details that the following tests should be carried out:</p> <ul style="list-style-type: none">a) Corner testb) Fuel package beneath a nozzle testc) Fuel package between two nozzles test.d) Ventilation test.e) Open room test. <p>At the specific request of the sponsor, only the corner test arrangement was used for the tests.</p> <p>This test has been reported as an Ad-Hoc test as a consequence of these deviations.</p>
Instruction to test	<p>The test was conducted on the 5th February and 1st July 2015 at the request of Plumis, the sponsor of the test.</p>
Provision of the system to test	<p>The system was supplied by the sponsor of the test. Exova Warringtonfire was not involved in any selection or sampling procedure.</p>
Conditioning of ignition and fuel packages	<p>The plywood sheets, sacrificial boards, wooden frames, foam sheets and wood crib sticks were conditioned to constant mass at a temperature of $23 \pm 2^{\circ}\text{C}$ and a relative humidity of $50 \pm 5\%$ prior to testing.</p> <p>The cribs were conditioned, such that the moisture content was $10 \pm 2\%$ at 3mm below the wood stick surface prior to testing.</p>
Ignition package	<p>Ignition packages, as detailed in Annex B.1.3 were used.</p>
Fuel package	<p>Fuel packages, as detailed in Annex B.1.4 were used.</p>
Test room	<p>The test room was constructed such that the dimensions detailed in B.1.1., were complied with, with the exception of the doorways which were constructed to a height of 2.2m, as specified by the sponsor of the test.</p>
Operating pressure	<p>The system's operating pressure was 80 bar declining to 75 bar over 10 minutes powered from a battery supply.</p>
Water usage	<p>55 litres.</p>

Description of system

The description of the system given below has been prepared from information provided by the sponsor of the test. All values quoted are nominal, unless tolerances are given.

General description		"Automist Personal Protection System" fire suppression system
System reference		"Automist Personal Protection System"
Name of manufacturer		Plumis
Detailed description		Automist pre-engineered active watermist fire suppression system
Nozzle	Product reference	"Production Automist PPS with 5 nozzle biased head"
	General description	Full cone 60° Watec 316SS nozzles with M13x1 thread, 0.288 K factor for A16 nozzle (1 per head) and 0.072 K factor for A4 nozzles (4 per head). 5 nozzle PPS production spray head (PPS_X06), 316SS machined.
	Name of manufacturer	Plumis supply chain
	Angle	5 nozzle wall head (PPS_X06) with 2 nozzles at an angle of 79° from the centreline and another 2 nozzles at 45° from centreline and 1 nozzle aligned with centreline.
	Colour reference	"316 stainless steel" "Silver" (observed by Exova Warringtonfire)
Pipe	Product reference	"Production High Pressure Stainless Steel pipe 1/4" BSP (PPS_X08)"
	Generic type	316SS Stainless Steel pipe
	Name of manufacturer	Plumis supply chain
	Diameter	¼" BSP P Schedule 80 (13.72mm external diameter)
	Wall thickness	6.1mm
	Length	448mm
	Density	7.87g/m ³
	Colour reference	"Black"
Flame retardant details		See Note 2 below
Pump	Product reference	"Production Pluvia Pump"
	General description	Automist Pluvia high pressure pump. 6.0 l/min, 90 bar working pressure, 120bar pressure limit.
	Name of manufacturer	Plumis supply chain
Water container	Product reference	"PPS_T01"
	General description	PPS (polyphenylene sulfide) water tank
	Total capacity	67 litres
	Name of manufacturer	Tektanks - custom Plumis design
Heat alarm	Product reference	"Ei164 Heat Alarm"
	General description	Aico 57° fixed point heat alarm
	Name of manufacturer	Ei Electronics
	Colour reference	"White"
Brief description of manufacturing process		See Note 1 below

Note 1. The sponsor was unable to provide this information.

Note 2. The sponsor of the test has confirmed that no flame retardant additives were utilised in the production of the component.

Test Results

Applicability of test results

The test results relate only to the behaviour of the system under the particular conditions of test, they are not intended to be the sole criterion for assessing the potential fire hazard of the system in use.

The test results relate only to the system in the form in which it was tested. Small differences in the composition of the system may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any system which is supplied or used is fully represented by the system which was tested.

Test results

Thermocouple location		Maximum temperature °C	
		Test 1	Test 2
75mm below the underside of the ceiling		799	69
Ceiling temperature – 6.5mm above the underside of the ceiling		163	36
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Key:

Test 1 – Room corner using 'free burn' without any suppression system and 1 plywood sheet per wall.

Test 2 – Room corner test.

Observations

The visual observations taken during the tests are shown in Appendix 1.

Temperatures

The temperatures logged during the tests are presented in Figures 1 and 2.

Fire test layout

Diagrams detailing the fire test layouts are presented in Figures 3 and 4.

Validity

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

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Appendix 1

Observations during test of Test 1

00:01 Test start, the fire loads were ignited.

04:23 Test terminated.

Observations during test of Test 2

00:01 Test start, the fire loads were ignited.

00:32 Heat alarm, fitted in the centre of the room sounded.

00:34 Nozzle activated manually.

10:34 Test terminated.

Figure 1

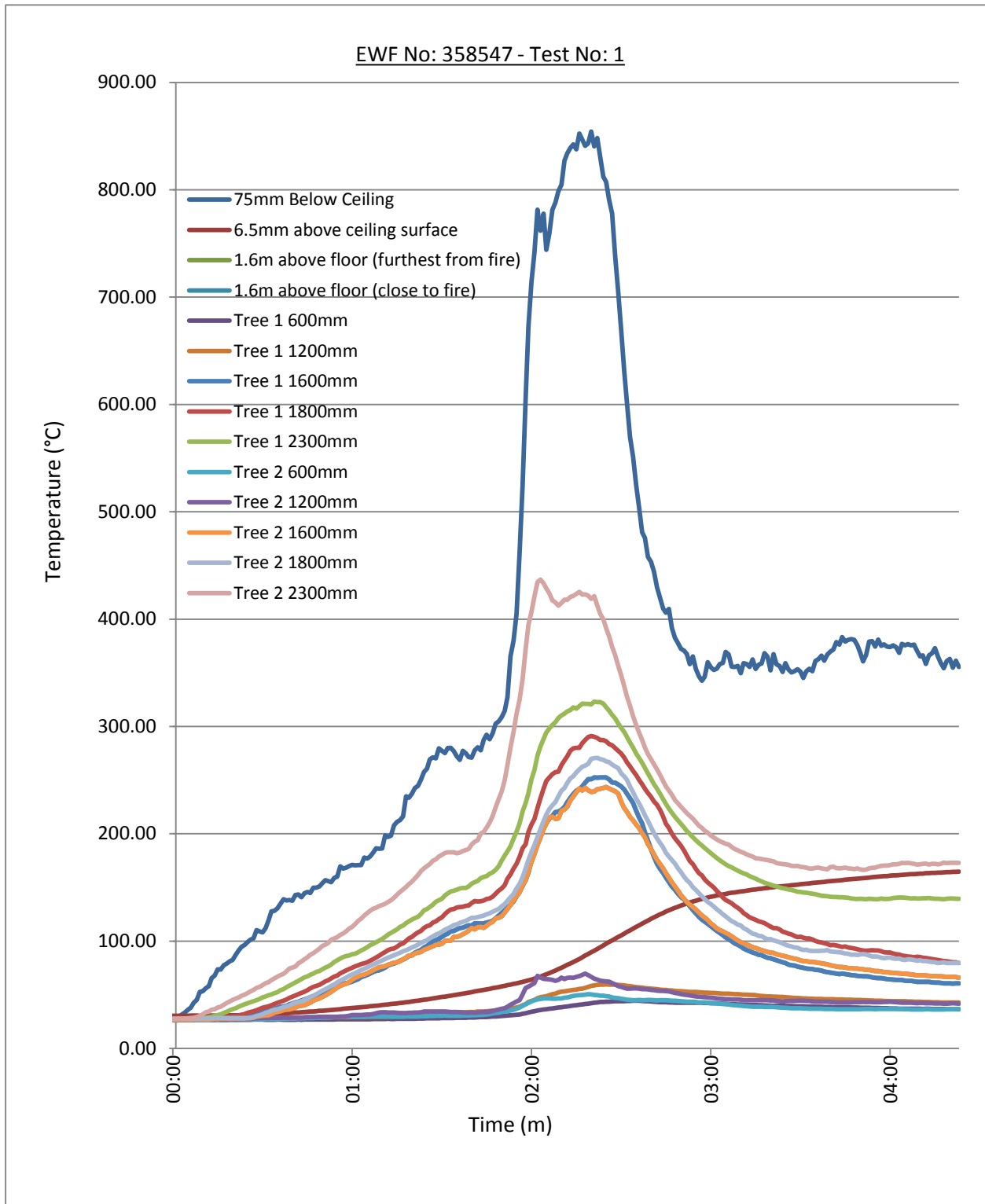


Figure 2

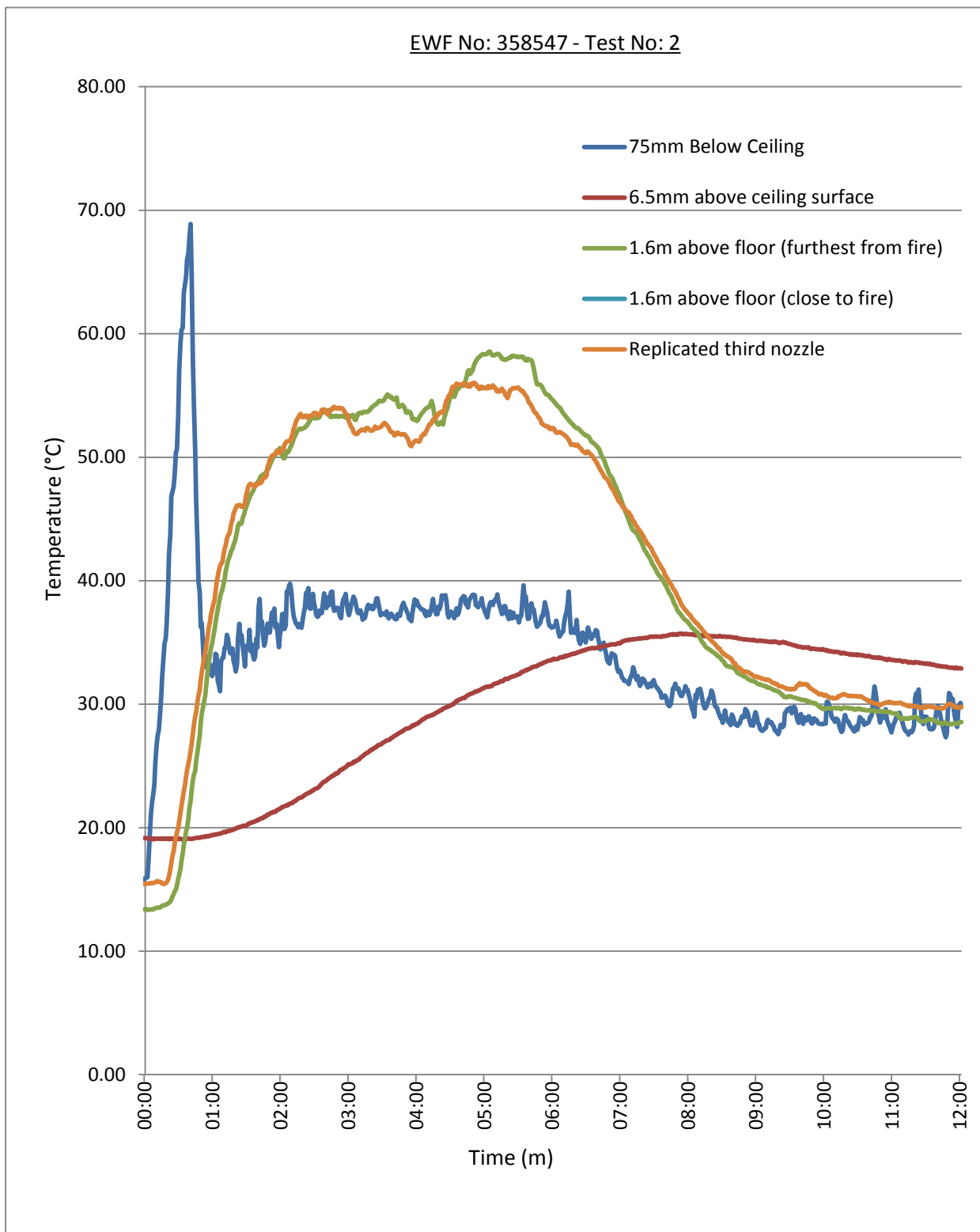
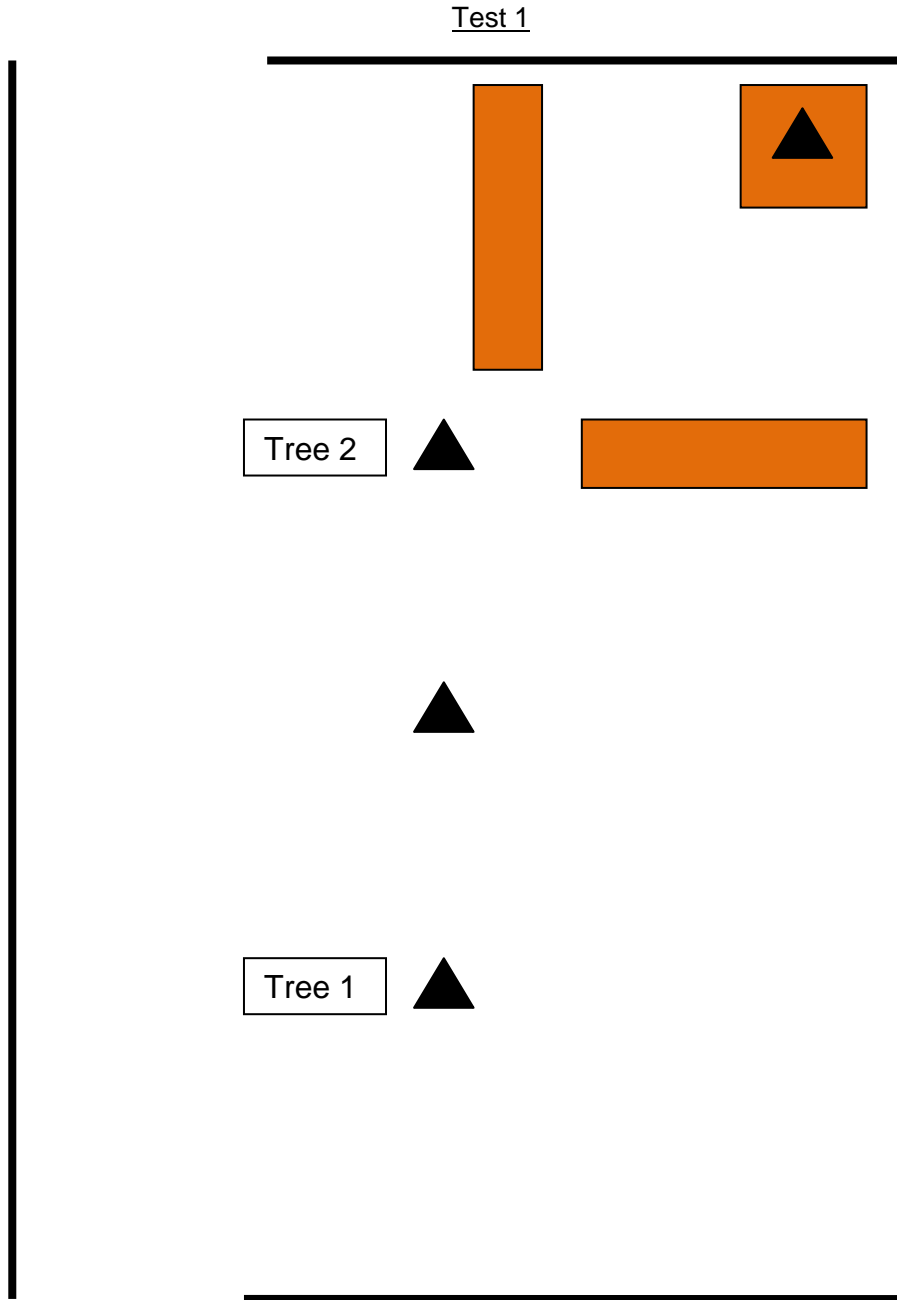


Figure 3



Key



Corner test ignition and fuel package



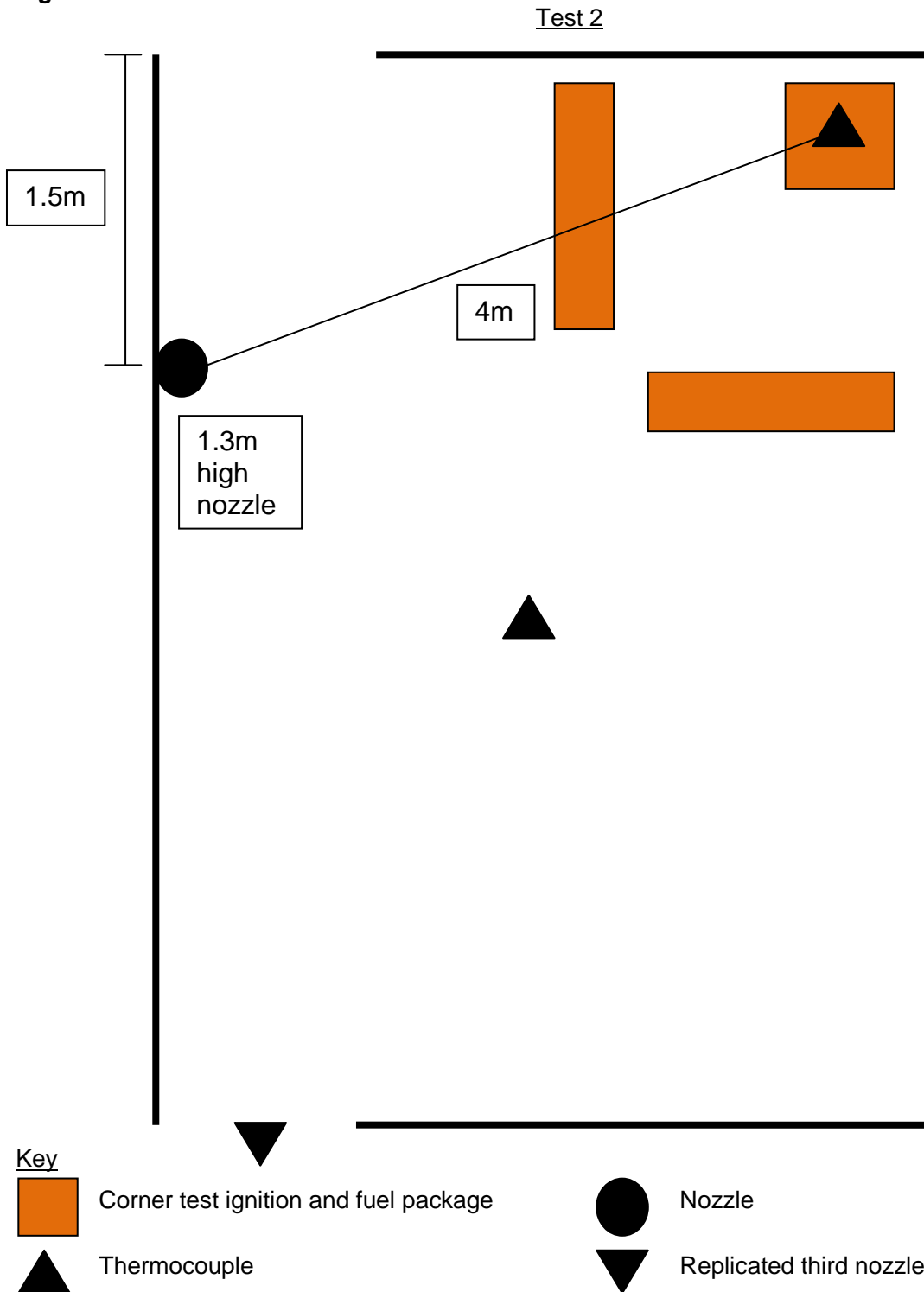
Nozzle



Thermocouple

Drawing not to scale

Figure 4



Drawing not to scale

Photographs



Photographs of ignition and fuel package before a test



Photographs of nozzle system before a test



Photographs during a test

Revision History

Issue No :	Issue Date:
Revised By:	Approved By:
Reason for Revision:	

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