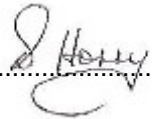


**Test Report (pdf copy)  
EMC Testing of  
Platinum Infrared Gas  
Sensor with screen  
connected to 0V  
For Dynament Ltd**

Document number 11377/TR/1

Project number C1453

Author: .....  
Mr D Horry  
EMC Technician



Checked: .....  
M Render  
Senior Engineer



Approved: .....  
M Render  
Senior Engineer



Issue	Description	Issue by	Date
1	<b>Issue one</b>	<b>DH</b>	<b>8<sup>th</sup> April 2014</b>

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This test reports relates only to the unit(s) tested



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**INVESTORS  
IN PEOPLE**

York EMC Services (2007) Ltd  
UNIVERSITY of York  
Heslington,  
York,  
YO10 5DD,  
UK

T: +44 (0)1904 324440  
F: +44 (0)1904 324434  
E: enquiry@yorkemc.co.uk

[www.yorkemc.co.uk](http://www.yorkemc.co.uk)

Registered in England and Wales  
Company Reg No. 6048589  
VAT Reg No. GB 647 2055 41

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## 1 Introduction

**Name and address of laboratory:** York EMC Services Ltd  
Three Lane Ends Business Centre  
Methley Road  
Castleford  
West Yorkshire  
WF10 1PN

**Name and address of client:** Dynament Ltd  
Hermitage Lane Industrial Estate  
Kings Mill Way  
Mansfield  
Nottingham  
NG18 5ER

The test results contained in this test report relate only to the unit(s) tested.

**Equipment under test** Infrared gas sensor with screen connected to 0V  
**Manufacturer** Dynament Ltd  
**Product name** Infrared gas sensor with screen connected to 0V  
**Model number** Premier series  
**Serial number** B 2716 N 96 (Voltage)  
**No. tested of each item** One  
**Customer supplied test plan ref.** None  
**Sensor firmware** 07.17.00 EU  
**Data logging version** Platinum IR sensor version 3.4.4 (EN50271)

**Date of receipt of EUT** 2<sup>nd</sup> April 2014  
**Method of receipt** Brought by the customer  
**Date(s) of test(s)** 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> April 2014  
**Date(s) when EUT was out of laboratory's control** None  
**Method of disposal** Taken by the customer  
**Personnel witnessing tests** Mr Frank Kups  
**Any other relevant information:** None

## 2 Test Specification

### 2.1 Description and Environment

The equipment is intended for use in the industrial environment. Specifically the equipment is normally installed within a portable gas detector suitable for explosive environments eg (mining or petro chemical plants).

### 2.2 Relevant standards

#### 2.2.1 Emissions

Generic Standard	Basic Standard	Class/limit	Test
EN61000-6-4:2007	Radiated emissions EN55016-2-3:2006	EN55016-2-3:2006	1&5

Note 1: The EUT was tested in one mode of operation for emissions.

2.2.2 Immunity

<b>Product Specific Standard</b>	<b>Basic Standard</b>	<b>Level</b>	<b>Test</b>
EN50270:2006	Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	10V/m, 80MHz-1000MHz, 80% 1kHz AM	2
	Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	3V/m, 1400MHz-2000MHz, 80% 1kHz AM	3
	Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	1V/m, 2000MHz-2700MHz, 80% 1kHz AM	4

Note 1: The EUT was tested in one mode of operation for immunity.

2.2.3 Performance criteria

The following parameters were monitored during immunity testing:

Parameter	Nominal value/state	Unacceptable change
Propane gas	55% LEL	± 5% LEL
Analogue voltage	1.28V	± 0.8V
Zero gas	0	± 5% LEL
Analogue voltage	0.40V	± 0.08V

**EMC tests for Platinum Infrared gas Sensor, Firmware V07.17.00EU**

**April 7<sup>th</sup> 2014**

**Functional Safety mode**

The Infrared gas sensor shall be gassed with zero gas and sample gas, 55% LEL propane, during the EMC tests. The zero gas and sample gas will be toggled once every minute to ensure that the functional safety of the sensor is not compromised during the tests.

The gas readings will be monitored both digitally and as an analogue voltage.

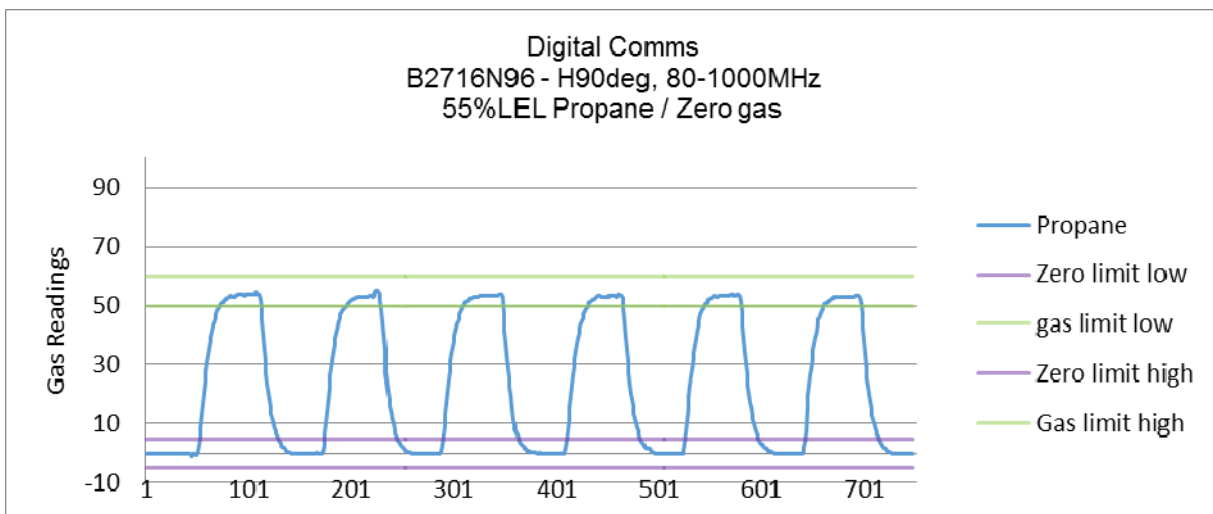
The equivalent zero / gas readings will be within ± 5% LEL.

Two sensors will be tested from an EMC point of view, i.e.

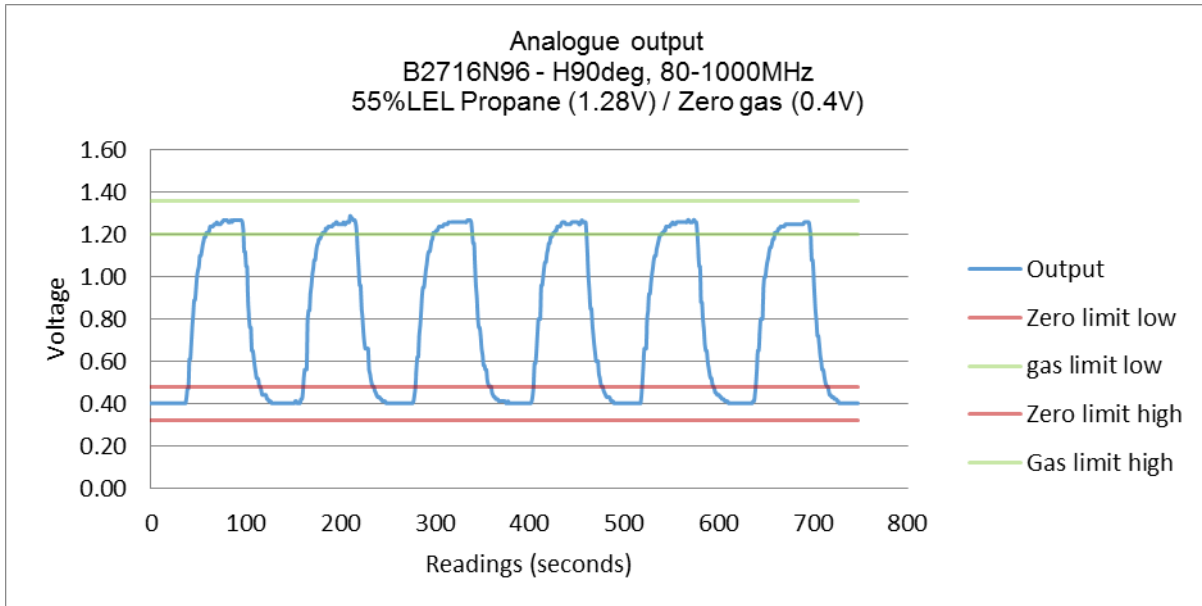
- 1) The sensor screen is connected to the 0V power supply.
- 2) The sensor screen is not connected to the 0V power supply.

**Typical results**

**Serial Digital Communications Data**



**Analogue Output Voltage Data**



### 3 Test Results

#### 3.1 Radiated emissions (30MHz to 1000MHz)

Mode of operation	Description	Mode No.
	Functional safety mode gas on gas off @ 1 minute intervals	1

Test standard	Test description	Class/limit
Radiated emissions EN55016-2-3:2006	Radiated emissions	As per EN55016-2-3:2006

Frequency (MHz)	Polarity (H/V)	Height (m)	Angle (degrees)	Detector Type	Meas distance (m)	Spec distance (m)	E field @ spec distance (dBuV/m)	E field Limit (dBuV/m)	Margin (dB)	Result	Date of measurement
42.60	V	1	145	QP	10	10	26.1	40.0	-13.9	Compliant	03/04/14
56.76	V	1	0	QP	10	10	15.1	40.0	-24.9	Compliant	03/04/14
70.98	V	1	0	QP	10	10	12.1	40.0	-27.9	Compliant	03/04/14
148.98	V	1	0	QP	10	10	10.3	40.0	-29.7	Compliant	03/04/14
152.50	V	1	0	QP	10	10	9.9	40.0	-30.1	Compliant	03/04/14
156.12	V	1	0	QP	10	10	10.0	40.0	-30.0	Compliant	03/04/14
170.28	V	1	0	QP	10	10	9.9	40.0	-30.1	Compliant	03/04/14
198.66	V	1	0	QP	10	10	10.9	40.0	-29.1	Compliant	03/04/14
227.04	V	1	0	QP	10	10	10.6	40.0	-29.4	Compliant	03/04/14

Modifications	Required for this test	Modification state
	None	0



**3.2 Radiated Immunity (80MHz to 1000MHz)**

Mode of operation	Description	Mode No.
	Functional safety mode gas on gas off @ 1 minute intervals	1

Test standard	Description	Dwell time (s)	Level
EN61000-4-3:2006 +A1:2008+A2:2010	Radiated immunity	3 seconds	10V/m, 80MHz-1000MHz, 80% 1kHz AM

Climatic conditions	Temperature (°C)	Humidity (%)
	21	38

Results	Mode	EUT face	Test Distance	Pol'n	Result	Observed effects & deviations from standard
	1	0°	3m	H	Pass	None
		90°	3m	H	Pass	None
		180°	3m	H	Pass	None
		270°	3m	H	Pass	None
		0°	3m	V	Pass	None
		90°	3m	V	Pass	None
		180°	3m	V	Pass	None
		270°	3m	V	Pass	None

Note 1: The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 270°.

Modifications	Required for this test	Modification state
	None	0

**3.3 Radiated Immunity (1400MHz to 2000MHz)**

Mode of operation	Description	Mode No.
	Functional safety mode gas on gas off @ 1 minute intervals	1

Test standard	Description	Dwell time (s)	Level
EN61000-4-3:2006 +A1:2008+A2:2010	Radiated immunity	3 seconds	3V/m, 1400MHz-2000MHz, 80% 1kHz AM

Climatic conditions	Temperature (°C)	Humidity (%)
	21	38

Results	Mode	EUT face	Test Distance	Pol'n	Result	Observed effects & deviations from standard
	1	0°	1m	H	Pass	None
		90°	1m	H	Pass	None
		180°	1m	H	Pass	None
		270°	1m	H	Pass	None
		0°	1m	V	Pass	None
		90°	1m	V	Pass	None
		180°	1m	V	Pass	None
		270°	1m	V	Pass	None

Note 1: The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 270°.

Modifications	Required for this test	Modification state
	None	0

**3.4 Radiated Immunity (1400MHz to 2700MHz)**

Mode of operation	Description	Mode No.
	Functional safety mode gas on gas off @ 1 minute intervals	1

Test standard	Description	Dwell time (s)	Level
EN61000-4-3:2006 +A1:2008+A2:2010	Radiated immunity	3 seconds	1V/m, 2000MHz-2700MHz, 80% 1kHz AM

Climatic conditions	Temperature (°C)	Humidity (%)
	21	38

Results	Mode	EUT face	Test Distance	Pol'n	Result	Observed effects & deviations from standard
	1	0°	1m	H	Pass	None
		90°	1m	H	Pass	None
		180°	1m	H	Pass	None
		270°	1m	H	Pass	None
		0°	1m	V	Pass	None
		90°	1m	V	Pass	None
		180°	1m	V	Pass	None
		270°	1m	V	Pass	None

Note 1: The front face of the EUT is deemed to be 0°, which is then turned in a clockwise direction through 270°.

Modifications	Required for this test	Modification state
	None	0

## 4      **Summary**

### 4.1      **Emissions**

<b>Product Specific Standard</b>	EN61000-6-4:2007
----------------------------------	------------------

<b>Basic Standard</b>	<b>Class/limit</b>	<b>Result</b>
Radiated emissions EN55016-2-3:2006	EN55016-2-3:2006	Pass

Note 1: The EUT was tested in one mode of operation for emissions.

**4.2 Immunity**

<b>Product Specific Standard</b>	EN50270:2006
----------------------------------	--------------

<b>Basic Standard</b>	<b>Level</b>	<b>Criterion</b>	<b>Result</b>
Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	10V/m, 80MHz-1000MHz, 80% 1kHz AM	A	Pass (Case A)
Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	3V/m, 1400MHz-2000MHz, 80% 1kHz AM	A	Pass (Case A)
Radiated Immunity EN61000-4-3:2006 +A1:2008+A2:2010	1V/m, 2000MHz-2700MHz, 80% 1kHz AM	A	Pass (Case A)

Note 1: The EUT was tested in one mode of operation for immunity.

## 5 Appendices

### 5.1 Appendix 1 Radiated emission test method (30MHz to 1000MHz)

#### 5.1.1 Test information

<b>Standards</b>	EN55016-2-3:2006
<b>YES Test Method</b>	CEP23
<b>Measurement uncertainty</b>	30MHz to 1GHz 5.0dB
<b>Equipment Used</b>	Rohde & Schwarz receiver Bilog antenna Rohde & Schwarz positioning mast and controller EMCO 2m diameter turntable and controller

Note: Specific set-ups for the EUT are shown in EUT test configurations section of this report (where applicable).

## 5.2 Appendix 2 Radiated immunity test method

### 5.2.1 Test information

<b>Standard</b>	EN61000-4-3:2006+A1:2008+A2:2010
<b>YES Test Method</b>	CEP30
<b>Equipment Used</b>	Anechoic Chamber RF Signal Generator Power Meter with Probes RF Power Amplifier Broadband Antenna Control Computer

*Note: Specific set-ups for the EUT are shown in EUT test configurations section of this report (where applicable).*

5.3 Appendix 3 Radiated emission test results

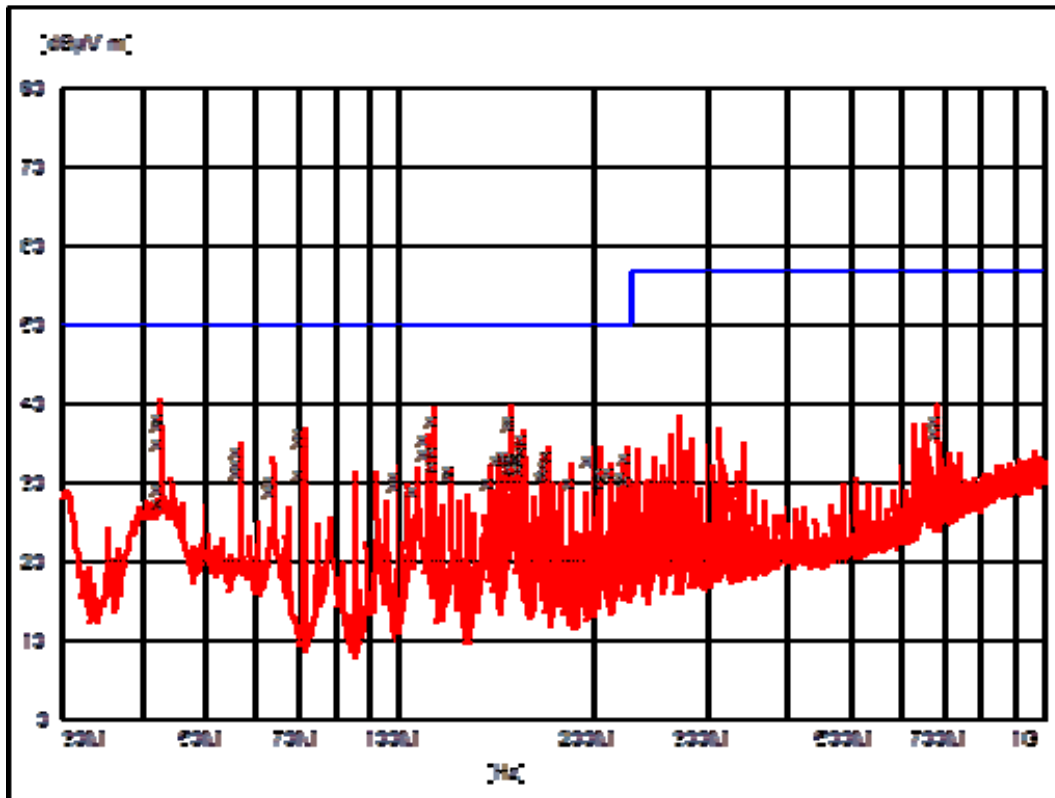


Figure 5.3.1 Radiated emissions results (R01, Chamber)

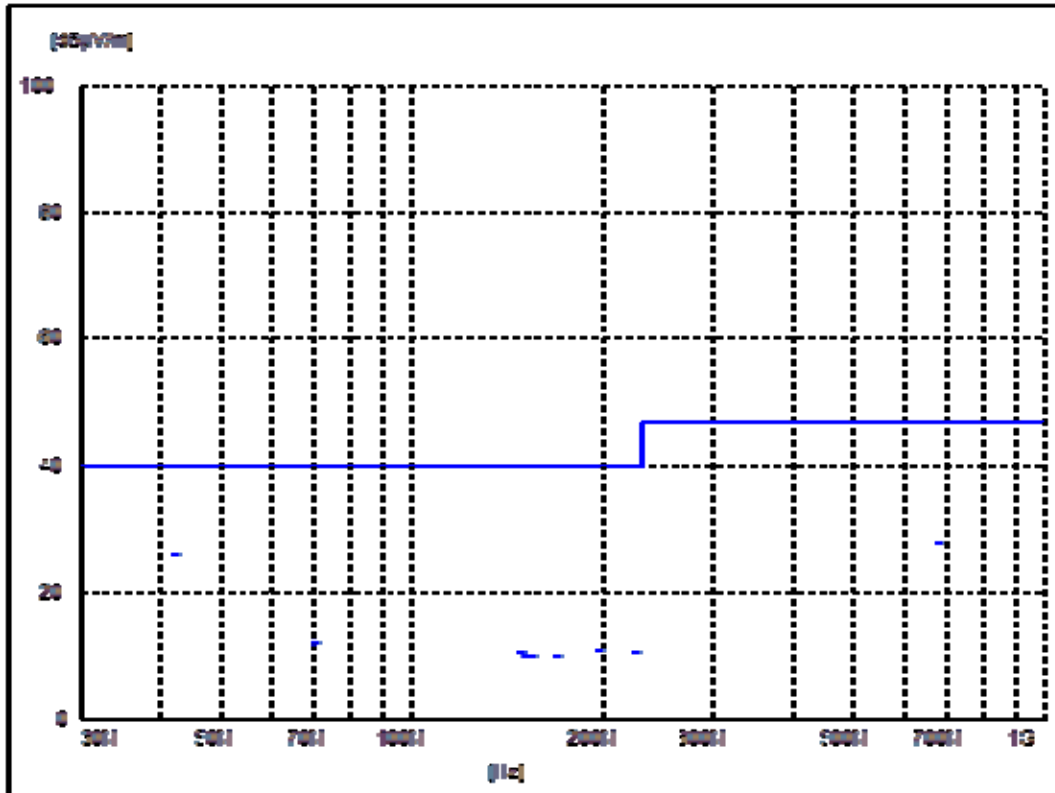


Figure 5.3.2 Radiated emissions results (R02, OATS)



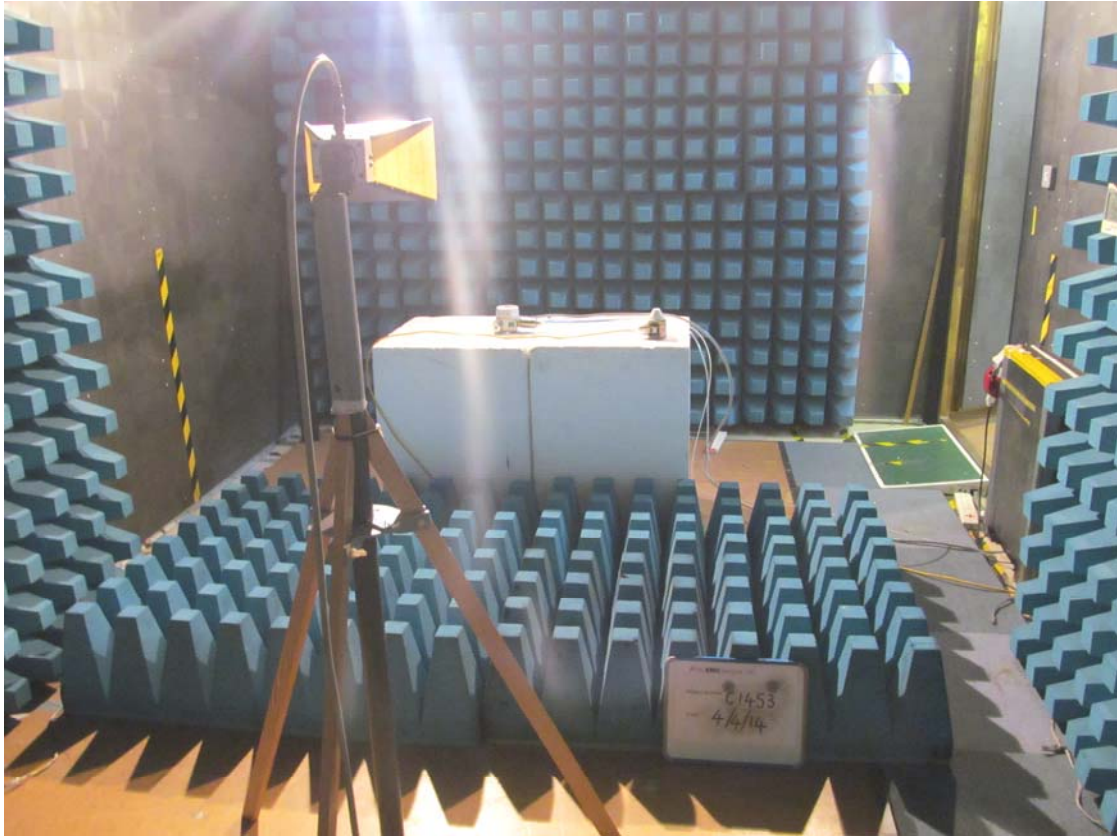
**5.4    Appendix 4    EUT test configurations**



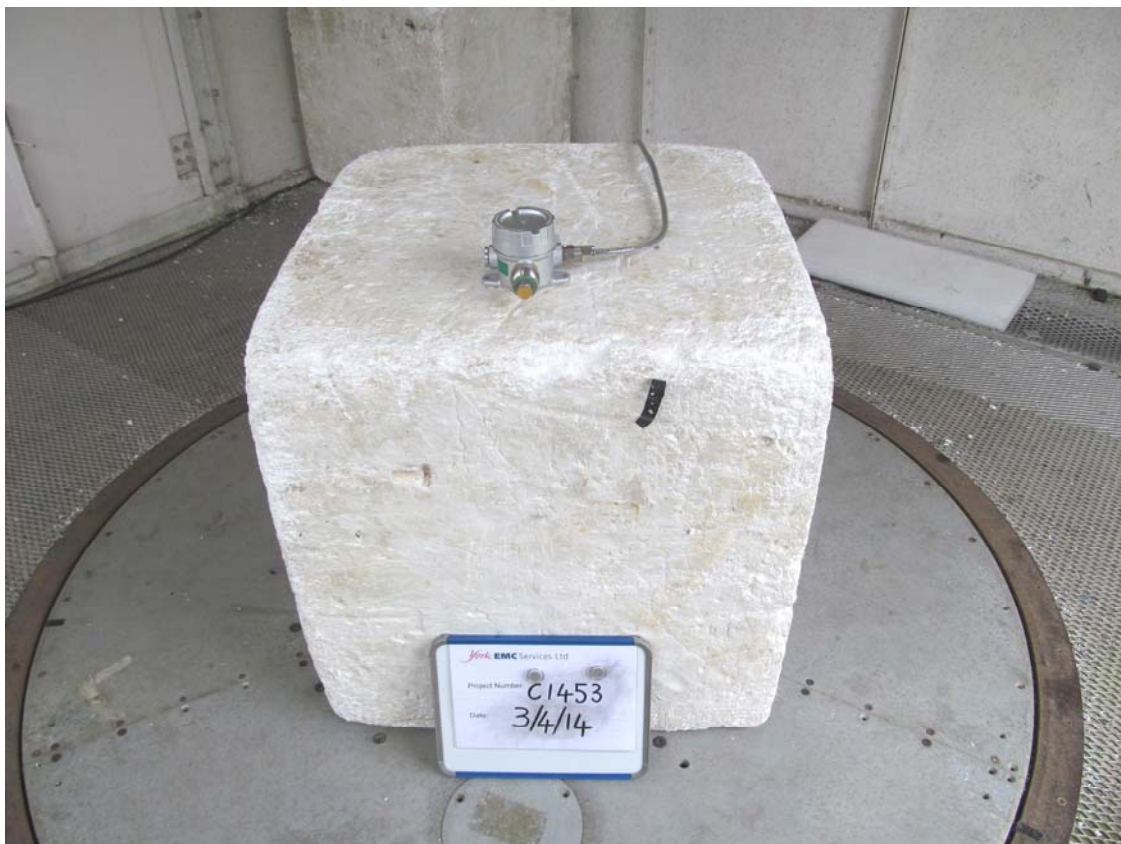
***Photograph 5.4.1 Radiated emissions testing, chamber***



***Photograph 5.4.2 Radiated immunity testing***



**Photograph 5.4.3 Radiated immunity > 1GHz testing**



**Photograph 5.4.4 Radiated emissions testing, OATS**

### 5.5 Appendix 5 Reporting the results

For test standards referring to EN 55022 and EN 55011: Measurement data is presented according to:

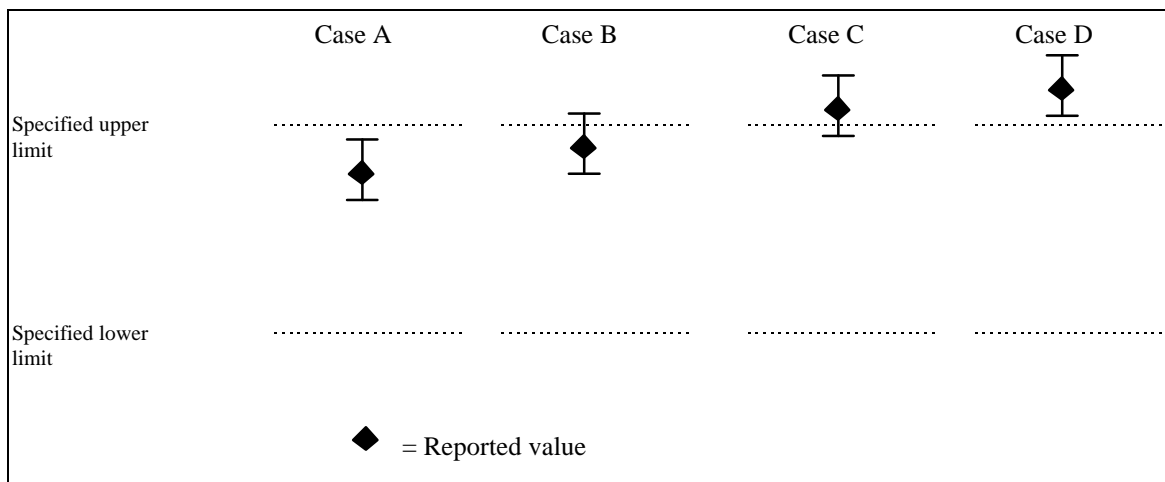
**“EN55016-4-2: 2004 Specification for radio disturbance and immunity measuring apparatus and methods Part 4-2: Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements”**

The measurement uncertainty is as follows for radiated and conducted emissions:

Test	$U_{lab}$	$U_{cispr}$
Conducted emissions (mains port) 150kHz to 30MHz	2.4dB	3.6dB
Radiated disturbance 30MHz to 1GHz	5.0dB (maximun)	5.2dB

For both the above tests, since  $U_{lab} < U_{cispr}$ , compliance is deemed to occur if no measured disturbance exceeds the disturbance limit.

For all other test standards, the results are reported as follows:



#### Case A

The equipment complies with the stated specification of the measured points, due allowance having been made for the uncertainty of the measurements. *It may be deemed as a pass.*

#### Case B

The measured result is below the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the stated level of confidence. However the result indicates that compliance is more probable than non-compliance with the specification limit. *It is a likely pass but within the measurement uncertainty.*

#### Case C

The measured result is above the specification limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliance based on the stated level of confidence. However the result indicates that non-compliance is more probable than compliance with the specification limit. *It is a likely fail but within the measurement uncertainty.*

#### Case D

The equipment does not comply with the stated specification of the measured points, due allowance having been made for the uncertainty of the measurements. *It may be deemed as a fail.*



**5.6 Appendix 6 Equipment used**

Equipment	No.	Cal Type	Used	Equipment	No.	Cal Type	Used
AR FM2000 Field Probe Set	78108	UKAS	✓	R&S SMY02 Signal Generator	78653	UKAS	
AR FM2000 Field Probe Set	78211	UKAS		Rolfe Heine 200A 3 Phase LISN	78206	UKAS	
AR50W1000 50W Amplifier	78313	NCS		Rolfe Heine 32A 3 Phase LISN	78205	UKAS	
Blackstar Function Generator	78200	In-house		Schaffner NSG1025 EFT/B Gen	78136	UKAS	
Chase Van Veen Loop	78217	In-house		Schaffner NSG2025 EFT/B Gen	78006	UKAS	
Chase CBL 6111A Bilog Antenna	78167	UKAS		Schaffner NSG2050 + PNW2055	78178	UKAS	
Chase CFL 9206 Transient Limiter	78101	In-house		Schaffner NSG435 ESD Simulator	78008	UKAS	
Chase HLA6120 Loop Antenna	78128	NPL		Schaffner NSG650 + CDN113	78478	UKAS	
Chase MDS21 Absorbing Clamp	78195	UKAS		Schaffner NSG2050 + PNW2056	78458	UKAS	
EMCO 3115 Double Ridged Horn	78347	Manufac		Schaffner Proflin	78374	UKAS	
Fischer FCC-801-M1-16 CDN	78240	UKAS		Schaffner voltage probe CVP2200	78596	UKAS	
Fischer FCC-801-M2-25 CDN	78241	UKAS		Schaffner current probe SMZ11	78569	UKAS	
Fischer FCC-801-M2-16 CDN	78400	UKAS		Schaffner T200 ISN	78591	UKAS	
Fischer FCC-801-M3-16 CDN	78044	UKAS		Schaffner T400 ISN	78570	UKAS	
Fischer FCC-801-M3-25 CDN	78242	UKAS		Schaffner Chase CBL6111C	78707	UKAS	✓
Fischer FCC-801-M4-25 CDN	78045	UKAS		Schaffner Chase CBL6112B	78708	Manufac	
Fischer EM clamp	78130	NCS		Schaffner INA 175 surge CDN	78461	In-house	
Fischer FCC-801-T2	78372	UKAS		Schaffner INA 172 surge CDN	78462	In-house	
Fluke 45 Digital Mutimeter	78655	UKAS		California instruments 5001ix	79136	UKAS	
Fluke 85 Digital Mutimeter	78375	UKAS		California instruments PACS-1	79135	UKAS	
Gould 475 Digital Oscilloscope	78057	UKAS		Fischer FCC-801-M3-25 CDN	79002	UKAS	
HP Infinium oscilloscope	78654	UKAS		Fischer FCC-801 M1-16 CDN	79001	UKAS	
HP programmable power supply	78657	UKAS		EM Test UCS 500	79059	UKAS	
Instek GFG-8020H	78673	In-house		Fischer FCC-801-M1-16 CDN			
ISO-TECH ICA32N current transducer	78677	NCS		Fisher FCC-801-M3-25 CDN	79001	UKAS	
ISO-TECH 9053 LCR meter	78487	NCS		Keytek AC line qualifier	79002	UKAS	
Keytek EMC Pro	78348	UKAS		Spitzenberger & Spies power source	78131	NCS	
Keytek MZ-15/EC ESD Simulator	78133	UKAS		6dB attenuator	79073	In-house	
LEM HEME LH2015 true RMS meter	78483	NCS		6dB attenuator	79074	In-house	
Marconi 2390	78349	UKAS		Magnetic immunity loop (single)	78475	In-house	
R&S ESH3-Z5 LISN	78037	UKAS		Magnetic immunity loop (multi)	78722	In-house	
R&S ESH3-Z5 LISN	78119	UKAS		Wandel & Golterman EFA-2	78551	Manufac	
R&S ESHS 10 Receiver	78035	UKAS		Schaffner EFT/B clamp	78690	In-house	
R&S ESHS10 Receiver	78106	UKAS		CDN 118	78460	In-house	
R&S ESVS 30 Receiver	78107	UKAS		Minizap ESD generator	78133	UKAS	
R&S ESVS10 Receiver	78036	UKAS		Fisher clamp	78043	NCS	
UCS 500	79054	UKAS	✓	AR25A250A Amplifier	79000	NCS	

Unit 5 immunity rack	Used	✓
<b>Equipment</b>	<b>No.</b>	<b>Cal Type</b>
R&S SMX Signal Generator	78117	UKAS
AR150W220A 150W Amplifier	78308	NCS
Schaffner CBA9443 amplifier	78682	In-house
R&S NRVD Power Meter	78314	UKAS
AR DC2600 Directional Coupler	78311	In-house
AR DC6080 Directional Coupler	78312	In-house
R&S URV5-Z2 10V Insertion Unit (9)	78040	UKAS
R&S URV5-Z4 100V Insertion Unit	78041	UKAS
Chase CBL 6140 X-Wing Antenna	78309	In-house

NCS - Not on calibration schedule

**5.7      Appendix 7 Customers test equipment used**

<b>Equipment</b>	<b>Serial number</b>	<b>Cal status</b>
HP Celeron laptop	CNU 74112 Z 9	N/A
Pico 11 channell data logger	GFY 61/092	N/A
Sensor configuration unit	None	N/A

**5.8 Appendix 8 Modification States**

<b>Modification state</b>	<b>Modification</b>
0	As supplied by the customer.

**5.9 Appendix 9 Test Report History**

<b>Issue</b>	<b>Modification details</b>
1	Original issue of the test report