Steatite

STEATITE TEST FACILITIES AND CAPABILITIES

TECHNOLOGY FOR EXTREME ENVIRONMENTS

COMPUTING

BATTERIES

COMMUNICATIONS

ANTENNAS

IMAGING

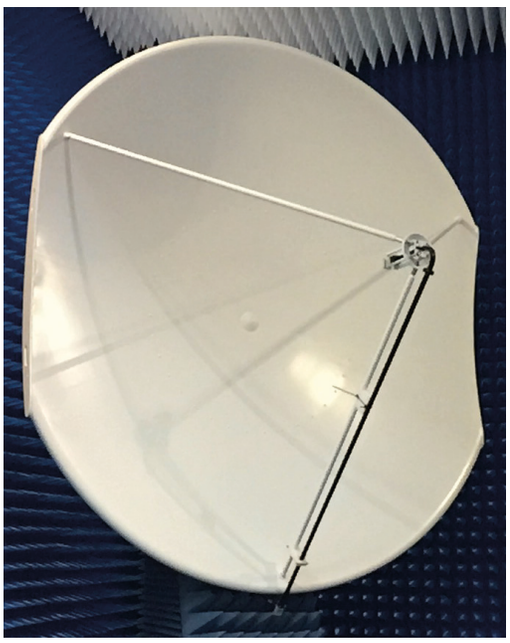
NEAR-FIELD RF TEST CHAMBER

Steatite is a market leader in the design, development, test and supply of complex technology for demanding applications and extreme operating environments. We specialise in a number of core areas - industrial and rugged computing, battery packs and power systems, communications, antennas, and imaging technologies.

Our antennas unit is housed in a custom-designed building on the outskirts of Leominster, Herefordshire in the United Kingdom. This facility provides substantial accommodation and facilities across our engineering, manufacturing and testing departments, together with business and support services.

At the heart of the facility is a world-class state-of-the-art spherical near-field RF test chamber that significantly enhances our measurement capabilities, and in many cases enables the company to exceed clients' needs and expectations.

The test chamber, measuring an impressive 7m x 5m, and 6m in height, accommodates antennas ranging in size from hand-held horns up to 3m diameter dishes, and across the frequency range of 500 MHz to 40 GHz. The techniques employed allow full far-field measurements to be derived without the complication of requiring a large scale external test range facility.



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BENEFITS OF THE TEST CHAMBER

Comprehensive measurements
Full three-dimensional patterns can be acquired in a single measurement with no need to separately set up for specific pattern cuts or polarisations. All data required to generate far-field co-polar, cross-polar or indeed any arbitrary polarisation component and pattern cut are captured in the near-field.

Accuracy
The system is more accurate than traditional far-field ranges. The processing system transforms raw measurement data beyond $2D^2/\lambda$ to infinity, thus removing any residual near-field influence (especially in sidelobes) that can persist even at the Rayleigh Range.

Diagnostic capability
The system has the ability to take a 3D far-field pattern profile and "back transform" to the radiating surface of the Antenna Under Test, thus revealing amplitude & phase profiles that could result in pattern anomalies.

Extended capability at high frequencies
By application of Distributed Signal Mixing, all RF signals are mixed down to Intermediate Frequency using mixing units located close to the antennas, thereby reducing signal loss in cables, thus upholding signal to noise quality and maintaining measurement accuracy.

Extended capability at low frequencies
By the application of Mathematical Absorber Reflection Suppression (MARS) technology that effectively removes wall reflections, the result is a capability that is not compromised by limitations in anechoic absorber performance.

Weather independence
The entire measurement facility is housed within a controlled environment, thus allowing year-long operation.

By working directly with the manufacturer of this cutting-edge measurement system it has been possible to gain invaluable practical knowledge and theoretical understanding enhancing the effectiveness of the test & measurement facility.

For more technical assessment of the benefits of a Near-Field range plus the comparisons to a traditional Far-Field range please see the Technical Note on our website www.steatite-antennas.co.uk

To discover more, or to discuss potential use of this excellent facility, please contact us directly at:

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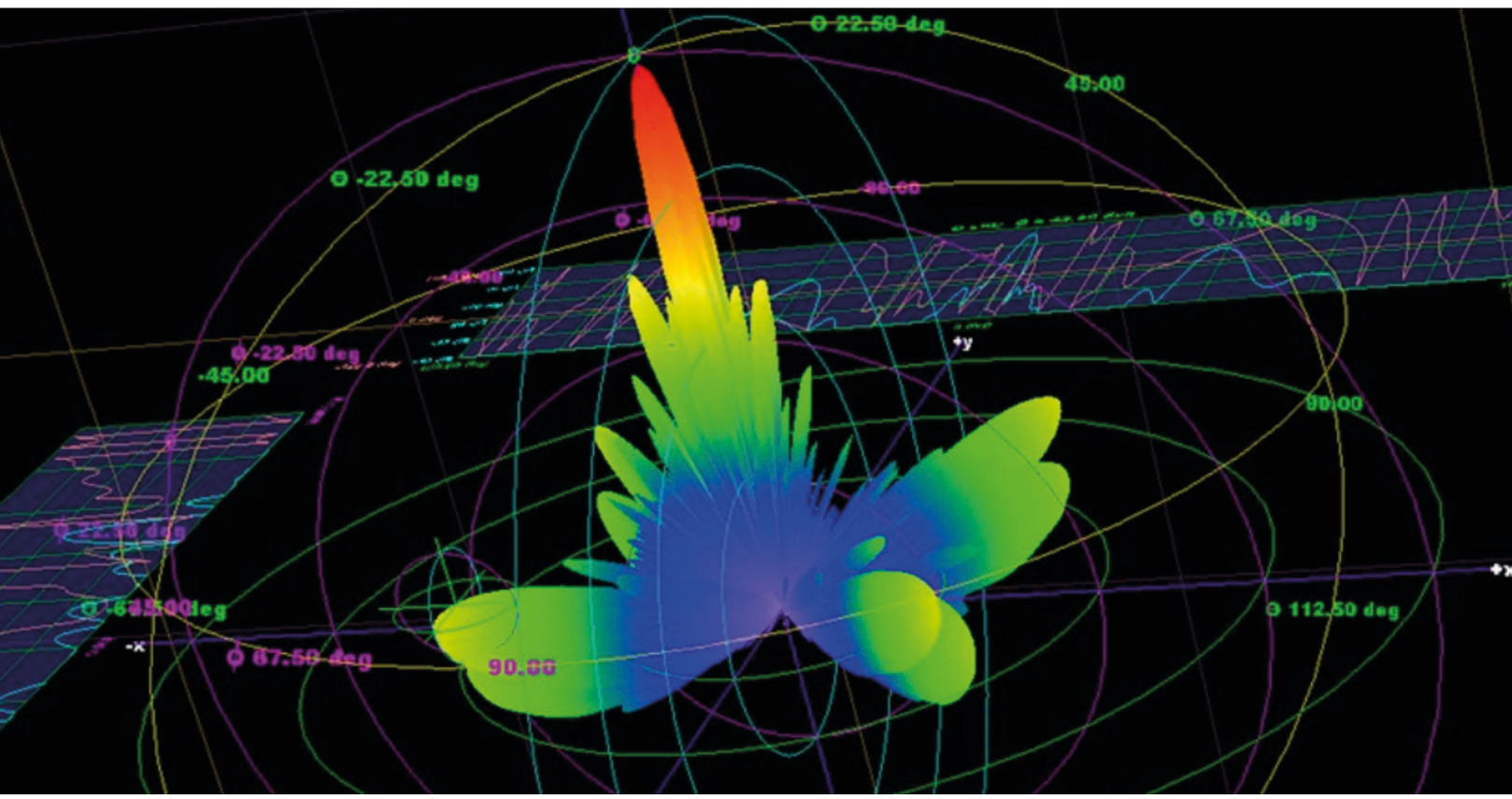

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SEMI-ANECHOIC EMC TEST CHAMBER

Steatite's Redditch facility is home to our compact semi-anechoic EMC test chamber. The facility allows EMC testing for emissions, both radiated and conducted, and Immunity, both radiated and conducted including electrical fast transients, surges and voltage dips. Having these in-house EMC test capabilities allows Steatite to significantly reduce design risks, while minimising the likelihood of additional external retest costs, which ultimately results in a solution that is delivered sooner and at lower cost than would otherwise be possible.

The Rainford EMC systems EMC-3C compact semi-anechoic chamber measures 7m x 4m x 3m, and is suitable for pre-compliance testing against CISPR, MIL STD 461 and DEF STAN 59-411 for both radiated and conducted emissions and immunity.

This facility will allow regulatory CE or UKCA pre-compliance testing to be carried out against a range of product / family standards in areas such as land, sea and air defence, medical and transportation sectors, for example, BS EN 55032 for emissions and BS EN 55035 for immunity for information technology equipment; BS EN 60945 for maritime electronic equipment and BS EN 50121-3-2 for railway equipment among others.

The chamber will also allow pre-compliance testing to a range of basic standards such as, among others, BS EN 61000-4-2 for electrostatic immunity; BS EN 61000-4-3 for radiated radio frequency immunity and BS EN 61000-4-6 for conducted radio frequency immunity.

In addition to the above, ad hoc testing is carried out during the design and development phases to allow for verification and validation and the de-risking of EMC issues for later pre-compliance and full compliance certification.

Calibration and compliance

The test equipment includes a Rohde and Schwarz Receiver going from 20 Hz up to 40 GHz and a range of pre-amplifiers, RF signal generators and RF power amplifiers up to 6 GHz.

A range of transducers are available such as various antennas going from 9 kHz up to 18 GHz; line impedance stabilisation networks; coupling; decoupling networks; current probes and current clamps, among others.

The facility is operated under the Steatite ISO9001:2015 quality management system and all test equipment is calibrated and traceable to National and international standards by UKAS accredited companies. Certificates of test and test reports can be provided for pre-compliance testing carried out as above.

The following table gives examples of some of out testing capabilities. For more detail please contact us:

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WHAT CAN WE TEST? SOME EXAMPLES

Product standard	Description	Test levels	Basic standard
BS EN 55032:2015	**Electromagnetic compatibility of multimedia equipment**		
Emissions	Conducted emissions	150 kHz to 30 MHz	BS EN 55032:2015 Tables A.8 - A.13.
	Radiated emissions	30 MHz to 6 GHz	BS EN 55032:2015 Tables A.1 - A.7.
BS EN 55035:2017	**Electromagnetic compatibility of multimedia equipment**		
Immunity	Electrostatic discharge	Contact 4 kV; Air 8 kV	BS EN 61000-4-2:2009
	Radio frequency E field	80 MHz to 5 GHz	BS EN 61000-4-3:2006+A2:2010
	Electrical fast transients / burst		BS EN 61000-4-4:2012
	Surges		BS EN 61000-4-5:2006
	Radio frequency conducted	0.15 MHz to 80 MHz	BS EN 61000-4-6:2009
	Power frequency H field		BS EN 61000-4-8:2010
	Voltage dips		BS EN 61000-4-11:2004
BS EN 60945:2002	**Maritime navigation and radiocommunication equipment**		
Emissions	Conducted emissions	10 kHz to 30 MHz	BS EN 60945:2002 Table 5
	Radiated emissions	150 kHz to 2 GHz	BS EN 60945:2002 Table 5
Immunity	Electrostatic discharge	Contact 6 kV; Air 8 kV	BS EN 61000-4-2:1995
	Radio frequency E field	80 MHz to 2 GHz	BS EN 61000-4-3:1995
	Electrical fast transients / burst		BS EN 61000-4-4:1995
	Surges		BS EN 61000-4-5:1995
	Radio frequency conducted	0.15 MHz to 80 MHz	BS EN 61000-4-6:1996
	Power frequency H field		BS EN 61000-4-8:1993
	Voltage dips		BS EN 61000-4-11:1994
BS EN 50121-3-2:2016	**Railway applications - Electromagnetic compatibility.**		
Emissions	Conducted emissions	150 kHz to 30 MHz	BS EN 55016-2-1:2014
	Radiated emissions	30 MHz to 1 GHz	BS EN 61000-6-4:2007
Immunity	Electrostatic discharge	Contact 6 kV; Air 8 kV	BS EN 61000-4-2:2009
	Radio frequency E field	80 MHz to 6 GHz	BS EN 61000-4-3:2006
	Electrical fast transients / burst		BS EN 61000-4-4:2012
	Surges		BS EN 61000-4-5:2014
	Radio frequency conducted	0.15 MHz to 80 MHz	BS EN 61000-4-6:2014
FCC	**Federal Communications Commission**		
Emissions	Conducted emissions	150 kHz to 30 MHz	§15.107 Conducted limits.
	Radiated emissions	30 MHz to 20 GHz	§15.109 Radiated emission limits.
MIL-STD-461G	**Requirements for the control of electromagnetic interference**		
	Personnel borne electrostatic discharge	Contact ±8 kV; Air ±15 kV	CS118
	Radiated emissions; magnetic field	30 Hz to 100 kHz	RE101
	Radiated emissions; electric field	10 kHz to 18 GHz	RE102
	Conducted emissions; audio frequency currents	30 Hz to 10 kHz	CE101
	Conducted emissions; radio frequency potential	10 kHz to 10 MHz	CE102
DEF STAN 59-411	**Electromagnetic compatibility; Test methods and limits**		
Pt 3 Iss 3	Conducted emissions: primary power lines	20 Hz to 150 MHz	DCE01
	Conducted emissions; control, signal & power lines	20 Hz to 150 MHz	DCE02
	Radiated emissions; E field	10 Hz to 18 GHz	DRE01
	Radiated emissions; H field	20 Hz to 100 kHz	DRE02
	Electrostatic discharge	Contact ±8 kV; Air ±15 kV	DCS10

Product standard	Description	Test levels	Basic standard
DEF STAN 59-411	**Electromagnetic compatibility; Test methods and limits**		
Pt 3 Iss 3			
MWP	Conducted emissions: primary power lines	N/A	DCE01
	Conducted emissions; control, signal & power lines	500 Hz to 150 MHz	DCE02
	Radiated emissions; E field	10 Hz to 18 GHz	DRE01
	Radiated emissions; H field	20 Hz to 100 kHz	DRE02
	Electrostatic discharge	Contact ±8 kV; Air ±15 kV	DCS10
Land	Conducted emissions: primary power lines	20 Hz to 150 MHz	DCE01
	Conducted emissions; control, signal & power lines	20 Hz to 150 MHz	DCE02
	Radiated emissions; E field	10 Hz to 18 GHz	DRE01
	Radiated emissions; H field	20 Hz to 100 kHz	DRE02
	Electrostatic discharge	Contact ±8 kV; Air ±15 kV	DCS10
Sea	Conducted emissions: primary power lines	20 Hz to 150 MHz	DCE01
	Conducted emissions; control, signal & power lines	20 Hz to 150 MHz	DCE02
	Radiated emissions; E field	10 Hz to 18 GHz	DRE01
	Radiated emissions; H field	20 Hz to 100 kHz	DRE02
	Electrostatic discharge	Contact ±8 kV; Air ±15 kV	DCS10
Air	Conducted emissions: primary power lines	20 Hz to 150 MHz	DCE01
	Conducted emissions; control, signal & power lines	20 Hz to 150 MHz	DCE02
	Radiated emissions; E field	10 Hz to 18 GHz	DRE01
	Radiated emissions; H field	20 Hz to 100 kHz	DRE02
	Electrostatic discharge	Contact ±8 kV; Air ±15 kV	DCS10

Product standard	Conducted emissions	Radiated emissions	Electro static discharge	Conducted susceptibility	Radiated susceptibility
BS EN 55032:2015	150 kHz to 30 MHz	30 MHz to 6 GHz			
BS EN 55035:2017			Contact 4 kV; Air 8kV	0.15 MHz to 80 MHz 1V to 3V	80 MHz to 5.0 GHz 3V/m
BS EN 60945:2002	10 kHz to 30 MHz	150 kHz to 2 GHz	Contact 6 kV; Air 8kV	0.15 MHz to 80 MHz 3V (rms) & 10V (rms)	80 MHz to 2 GHz 10 V/m
BS EN 50121-3-2:2016	150 kHz to 30 MHz	30 MHz to 1 GHz	Contact 6 kV; Air 8kV	0.15 MHz to 80 MHz 10V (rms)	80 MHz to 6.1 GHz 3 - 20V/m
FCC	10 kHz to 30 MHz	150 kHz to 20 GHz	Contact ±6 kV; Air ±8 kV	0.15 MHz to 80 MHz 1 V to 10 V	80 MHz to 6 GHz; 1V/m to 20 V/m
MIL-STD-461G	10 KHz to 10 MHz	10 kHz to 18 GHz	Contact ±8 kV; Air ±15 kV		
DEF STAN 59-411	20 Hz to 150 MHz	10 kHz to 18 GHz	Contact ±8 kV; Air ±15 kV	0.15 MHz to 80 MHz	80 MHz to 6 GHz

Further information

For more infomation regarding our semi-anechoic EMC test chamber, please contact us using the following details:

Tel: +44 (0)1527 512400
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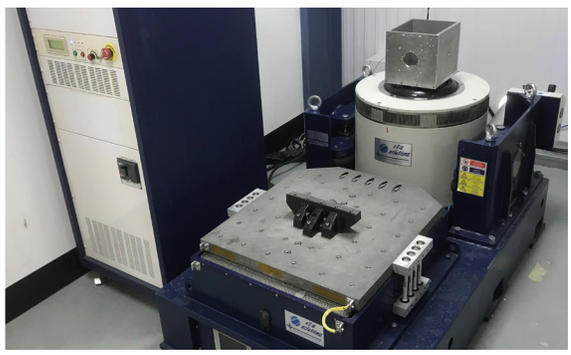
ENVIRONMENTAL TEST CAPABILITY

As a market leader in the design, development and supply of complex technology for use in critical applications and extreme operating environments, Steatite equipment needs to undergo rigorous testing for environmental conditions. From the sea floor to the edge of space, Steatite technology plays a vital role in many ground breaking applications, vital systems and critical infrastructure and must demonstrate high levels of reliability.

Rugged technology requires extensive testing to ensure that nothing fails when subjected to extremes of temperature, vibration and contaminants such as dust or moisture. As a result, our expertise extends to comprehensive in house testing which ensures that the Steatite name remains synonymous with quality and reliability.

At the heart of our purpose build facility in Leominster, Herefordshire is an extensive environmental testing laboratory and state-of-the-art anechoic spherical RF test chamber (detailed earlier in this brochure).



Incorporating a climatic chamber, vibration table, and altitude test chamber, we are able to test our products to exacting standards for shock, vibration, temperature and humidity. In addition, we can simulate the low pressure conditions of >50,000ft as required for some of our antenna units.

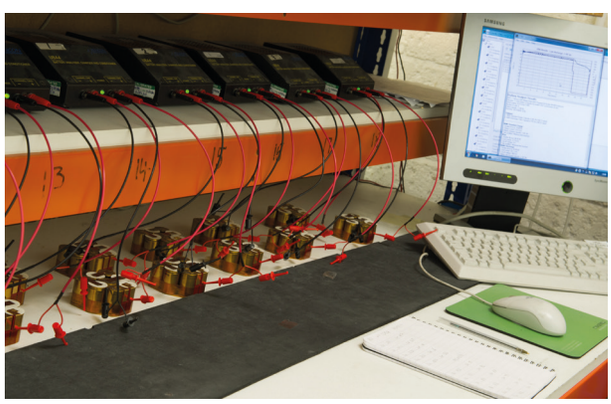
Our climatic chamber can achieve temperatures from -40°C to +150°C as well as 98% relative humidity, whereas our vibration and shock table is capable of performing all classical shock pulses to 1,200kgf. Sinusoidal, random and sine-on-random vibration testing can be performed up to 600kgf on units up to 300kg mass and frequencies up to 3,500Hz. Testing can be carried out in all 3 axis with great accuracy.

BATTERY TESTING

Our battery facility in Crewkerne, UK, has over 100 test channels for analysing battery packs. These are used both to characterise new cells to aid in our cell selection when designing new custom battery packs and also for validating correct operation of new packs for our customers. Some customers demand that every pack we produce for them is fully charged and discharged in order to verify proper operation for the more demanding applications.

In addition to our standard battery testing capabilities, we often design and build bespoke test equipment to analyse, program and test many of the custom battery packs that we design and manufacture. For our more advanced batteries that are designed to operate in high temperature environments we also have a large thermal test chamber.

Finally, our battery test facility houses a large selection of power supplies and electronic loads to enable automated emulation of customer applications to aid with testing suitability and projected lifetime of battery packs, often before the final application design is completed.



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