Museum Showcase
Conservation Research & Testing

CLICKNETHERFIELD

THE QUEEN'S AWARDS FOR ENTERPRISE 2008

By Appointment to HM the Queen
Display Case Suppliers

Showcasing Your Vision

Key Conservation Areas

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- Construction Materials
- Air Exchange Rate
- Humidity Control
- Temperature Control
- Low Oxygen Environment
- Sterilisation of Bacteria
- Filtration of Pollutants
- UV & IR Filtration
- Light Exposure

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Construction Materials

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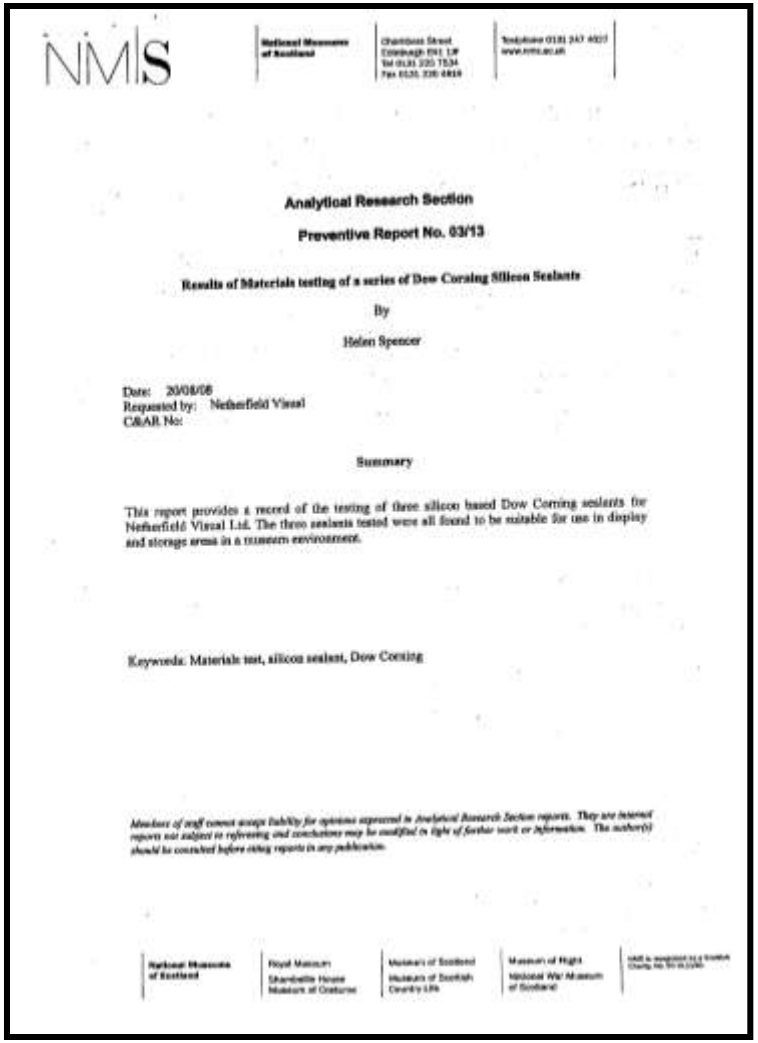
The need for inert case material is well-known to museums because with artifacts sometimes sealed within cases for many years it is important that the case does not generate pollutants that can react with and damage objects on display.

Conservation teams have developed a number of tests to check whether materials are inert and safe to use in cases, the most common being the Oddy test. Over many years we have identified and tested a range of materials including adhesives, seals, fabrics and sheet materials which have been approved for permanent use within cases.

These tests have been carried out by organisations such as:

- The British Museum
- The Smithsonian Institute
- The National Museums of Scotland
- National Archives and Records Administration
- National Parks

As well as the range of showcase construction materials we already have approved, we are constantly identifying and testing new adhesives and finishes to satisfy future performance and environmental challenges.



NMS

National Museums of Scotland

Analytical Research Section

Preventive Report No. 03/13

Results of Materials testing of a series of Dow Corning Silicon Sealants

By

Helen Spencer

Date: 20/08/08
Requested by: Netherfield Visual
C&AR No:

Summary

This report provides a record of the testing of three silicon based Dow Corning sealants for Netherfield Visual Ltd. The three sealants tested were all found to be suitable for use in display and storage areas in a museum environment.

Keywords: Materials test, silicon sealant, Dow Corning

Members of staff cannot accept liability for opinions expressed in Analytical Research Section reports. They are internal reports not subject to refereeing and conclusions may be modified in light of further work or information. The author(s) should be consulted before citing reports in any publication.

National Museums of Scotland | Royal Museum | Museum of Scotland | Museum of Flight

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Air Exchange Rate

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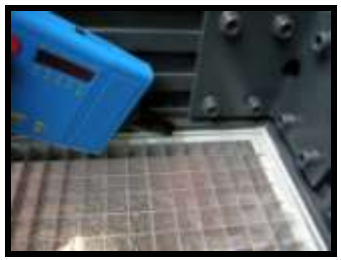
A well sealed display case is recognised as the best way to protect artifacts on display and this characteristic of a case can be defined and quantified by it's Air Exchange Rate.

An air exchange rate of 0.1 is now regularly include within performance specifications for display cases yet it can only be achieved by specialist companies such as ClickNetherfield with case designs that incorporate techniques developed over many years.

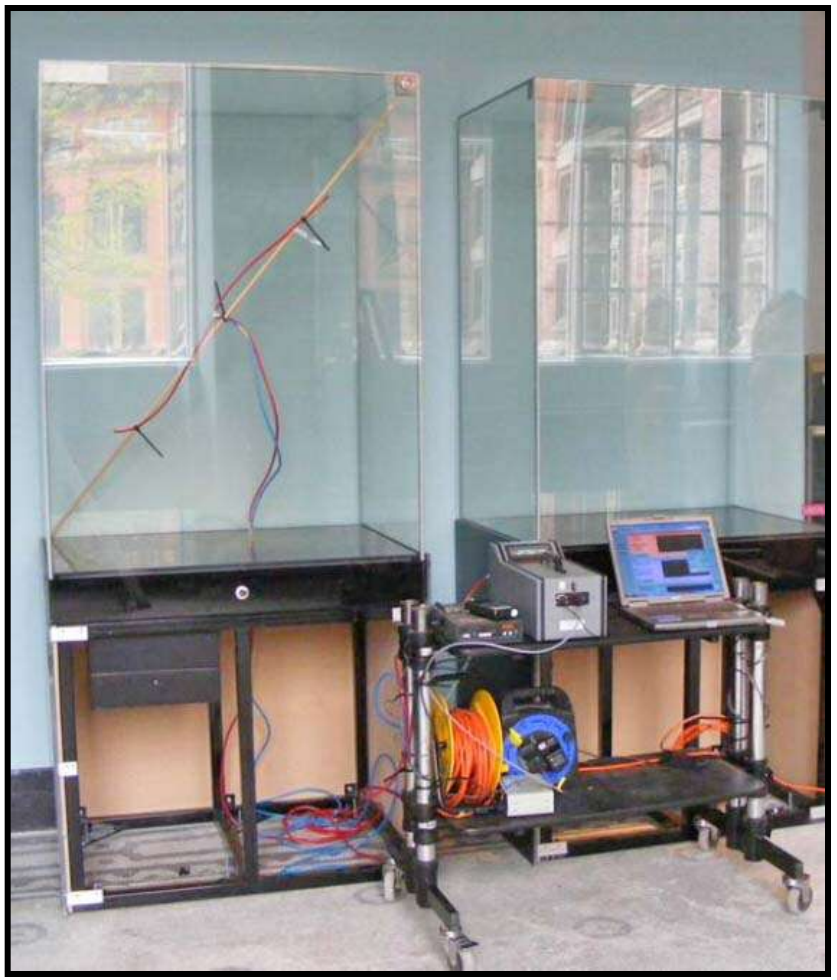
Our industry leading AER performance relies on our expertise in the three key areas of design, manufacture and installation:

- When we design a showcase we can call on years of experience, a fully-equipped prototyping workshop and a vast body of data collected from every showcase we have ever designed.
- When we build a case we do so in our modern and well-equipped factory, working to the high tolerances required to ensure that our finished products meet the AER levels defined during the design process.
- When we install a showcase, our fitters will use non-invasive ultrasonic testing techniques to ensure that their work meets our AER standards, making sure that doors, locks and case components are fitted accurately and correctly. It is this attention to detail that ensures that your new case meets your AER requirements.



Ultrasonic Leak Testing

Carbon Dioxide Air Exchange Test



Nitrous Oxide BSRIA Air Exchange Test

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AER Test Results

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Our quality management team now regularly carry out CO2 air exchange testing of cases at final assembly in our factory and on site as part of our formal handover procedures.

We have also been able to calibrate and verify our test results against BSRIA test results on the same individual cases.

Our ability to carry out repeat air exchange testing in house has shaped the development of our case systems and allows us to push the boundaries of case design whilst maintaining the highest standards of sealing.


BSRIA

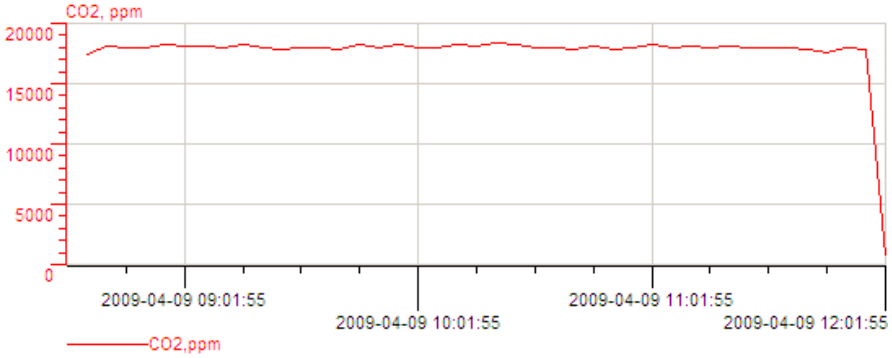
Report

Air Change Rate Testing of Display Cabinets

Victoria & Albert Museum

National Museums Liverpool Air Change Test Report

AER - 280739



BSRIA Air Exchange Rate Tests
Conducted on Click Netherfield Ltd Cases

Project/Customer	Job No.	Case System	Case Ref.	Display Volume Dimensions (mtrs)	Display Volume (cubic mtrs)	Test Date	Air Exchange Rate per day
Medieval Gallery		VISTA		Various Cases	Varies	Nov. 2005	Passed
Museum of London							
Report No's Not Known				Report not issued publicly.			
Churchill Museum		BESPOKE	1.1.01			Dec. 2004	0.09
Report 21190A		BESPOKE	2.1.01			Dec. 2004	0.23
		BESPOKE	3.1.02			Dec. 2004	0.44
		PRISM					See notes
						Average	0.25
Museum of Childhood		VISTA IV				Mar. 2003	Passed
Report No's Not Known							
				Report not issued publicly.			
Manchester Museum	20675	INCA	I/4	1.640 x 1.640 x 1.640	4.41	Mar. 2003	0.13
Report 16703A/1	20675	INCA	SA2	4.240 x 0.600 x 2.200	5.60	Mar. 2003	0.19
	20675	INCA	E/7,8,9	Multiple Shaped Case	41.13	Mar. 2003	0.08
	20675	INCA	E/1	3.830 x 0.800 x 2.200	6.74	Mar. 2003	0.13
						Average	0.13
Manchester City Art		VISTA	VTC1			June. 2002	Passed
Gallery							
Report No's Not Known				Report not issued publicly.			
Royal Academy		SPECTRUM	S1C1	0.700 x 0.700 x 2.200	1.1	March. 2001	0.12
of Music		SPECTRUM	TAC 1	3.000 x 0.700 x 2.200	4.62	March. 2001	0.13
Report 16136A/1							
						Average	0.13
Royal Academy		SPECTRUM	S1C1	3.000 x 0.700 x 2.200	4.62	Jan. 2001	0.14
of Music		SPECTRUM	TAC1-2	0.700 x 0.700 x 2.200	1.1	Jan. 2001	0.45
Report 15930A/1							
						Average	0.30
Royal Academy		SPECTRUM	Prototype	0.700 x 0.700 x 2.200	1.1	Nov. 2000	0.04
of Music							
Report 15745A/1						Average	0.04
Gilbert Collection	17750	INCA	M25/1	0.650 x 0.650 x 1.250	0.53	Feb. 2000	0.23
Report 15136A/1	17750	INCA	M26/1	0.650 x 0.650 x 1.250	0.53	Feb. 2000	0.20
	17750	INCA	M30/1	1 .000 x 0.650 x 1.250	0.81	Feb. 2000	0.04
	17750	INCA	M38/1	1.500 x 0.400 x 1.250	0.75	Feb. 2000	0.12
	17750	INCA	M31/1	5.400 x 0.400 x 1.250	2.70	Feb. 2000	0.06
	17750	INCA	M31/3	0.800 x 0.800 x 1.250	0.80	Feb. 2000	0.22
	17750	INCA	B56/1	1.100 x 0.580 x 1.880	1.20	Feb. 2000	0.06
	17750	INCA	B56/4	0.580 x 0.580 x 1.880	0.63	Feb. 2000	0.06
						Average	0.12
Gilbert Collection	17750	CLAM	Type G	0.500 x 0.500 x 1.000	0.25	Sept. 1999	0.10
Report 15078A/1	17750	CLAM	Type Q	1.000 x 0.500 x 0.350	0.18	Sept. 1999	0.03
						Average	0.07
Liverpool Life	18687	INCA		1.200 x 0.600 x 1.900	1.37	Feb. 2000	0.13
Report 15124A	18687	MONO + c.		1.100 x 0.550 x 2.150	1.30	Feb. 2000	0.05
						Average	0.09
British Museum	17189	INCA	Case 5	0.900 x 1.250 x 1.605	1.81	Aug. 1998	0.07
Report numbers		INCA	Case 7	2.800 x 0.700 x 1.605	3.15	Aug. 1998	0.12
not available	19570	INCA	Case 8	2.250 x 0.950 x 1.000	2.14	Oct. 2000	0.11
		INCA	Case 6	2.250 x 0.950 x 1.000	2.14	Oct. 2000	0.11
		INCA	Case 5	2.250 x 0.950 x 1.000	2.14	Oct. 2000	0.10
		INCA	Case 3	2.400 x 0.620 x 1.963	2.92	Oct. 2000	0.33
		INCA	Case 11	0.950 x 0.950 x 1.000	0.90	Oct. 2000	0.05
		INCA	Case 9	1.960 x 0.850 x 1.000	1.67	Oct. 2000	0.06
		INCA	Case 16	2.985 x 1.200 x 2.553	9.14	Oct. 2000	0.10
		INCA	Case 17	2.985 x 1.200 x 2.553	9.14	Oct. 2000	0.13
		INCA	Case 18	2.985 x 1.200 x 2.553	9.14	Oct. 2000	0.12
						Average	0.12
V & A Museum	9405	INCA	Corridor	not recorded		Sept. 1992	0.08
Report 10811/1		INCA	Gallery	not recorded		Sept. 1992	0.29
						Average	0.19

Average Daily Air Exchange Rate Based on 40no BSRIA Tests **0.14**

Note: several tests were unduly influenced by unfavourable air movements in the galleries whilst the tests were taking place - these ranged from air conditioning/recycling tests, to windows and doors being opened/closed on a regular basis - all of which w

Notes

BSRIA noted that "Smaller desk top cases (eg case 3.1.02) tend to exhibit higher air change rates than full height display cases because of the surface/crack length to volume ratio."

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Humidity Control

Humidity variation is a major cause of damage to museum objects.

A well-sealed glass showcase will buffer your exhibits against rapid changes in ambient humidity. If you know that the case will be sited somewhere that experiences regular humidity changes, then we can provide two basic alternatives:

Passive Absorbers

Silica Gel, Artsorb and Prosorb are hygroscopic materials. This means that they absorb and release moisture from the air. We recommend 1Kg of absorber per cubic metre of case volume (i.e., a 3m3 case would need 3Kg of absorber).

These materials will need to be monitored and re-conditioned on an ongoing basis however, with larger volumes of conditioning materials equivalent to 10% of the display case volume it has been demonstrated that no maintenance of materials was required.

Passive absorbers can only buffer humidity levels. It isn't possible for them to keep the inside of the case significantly less humid than the ambient air, but they are able to control the speed of these changes, protecting your exhibits from dramatic variations.

Active Humidity Control

Where you need conditions inside the case to be significantly different from the ambient, or where ambient humidity changes more quickly than passive absorbers can handle, then you need an active humidity control system.

These can be individual units inside each case which circulate the air or more complex systems serving multiple cases which can provide circulation or positive pressure.

They are highly specialised and costly due to the small volume of air that they must manage, the narrow range of humidity that they must support and the damage that could be caused if they fail. The humidity management systems that we supply can control case humidity within a range of +/- 3%

Artsorb Cassette

Single Case Active Humidity Control

Multi-case Active Humidity Control System

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Temperature Control

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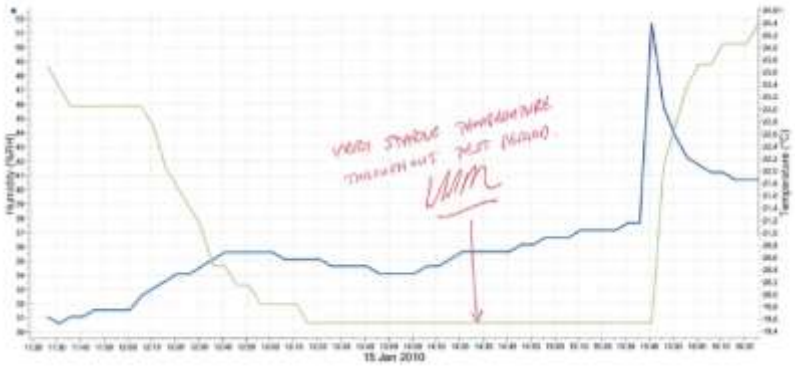
Because temperature is inversely linked to humidity then temperature changes will also directly affect the humidity level within a case.

Display cases should be located away from sources of heat such as sunlight, radiators or heating vents and lighting components that generate heat should be mounted away from the display chamber with ventilation fans used as required.

Most showcase materials (glass, steel, timber sheet) are poor thermal insulators. This means that the inside of your case will usually be at the same temperature as the room in which the case is located.

We are able to control temperature within a showcase that is specially constructed with insulated sides and double glazing to ensure that stable temperatures are achieved for critical exhibits



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The Combined Solution

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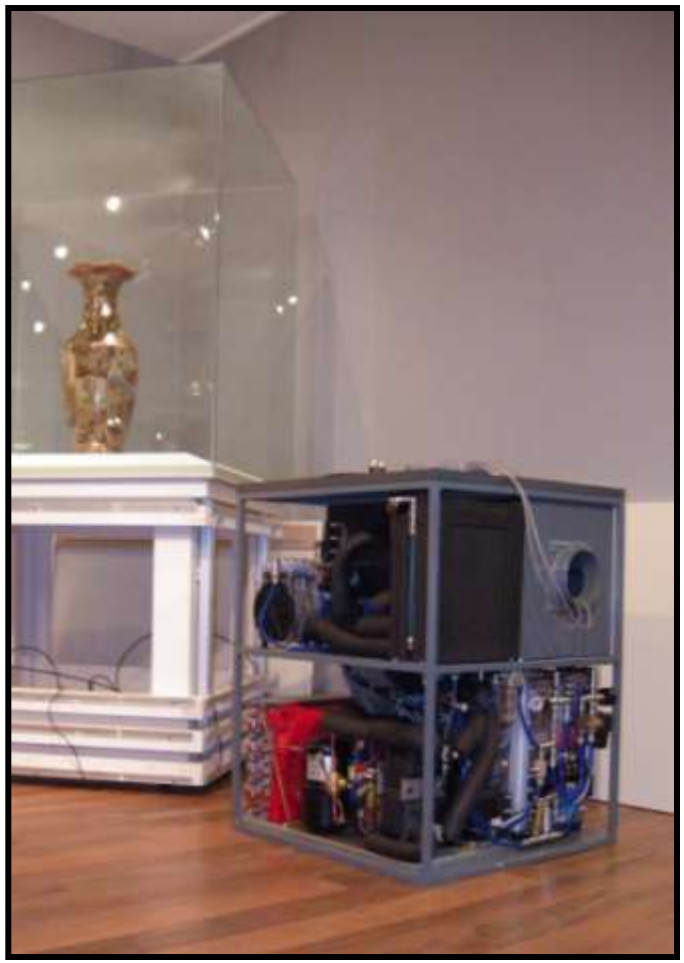
There are certain artifacts that require exceptional environments, these can include Nation defining documents, mummies or asteroids from outer space.

We can provide combined systems that all or some of the following control systems within a single combined unit:

- Humidity Control
- Temperature Control
- Filtration of Pollutants thorugh molecular carbon sieve
- Sterilisation of Bacteria with UV light
- Low oxygen environment through nitrogen generation

These systems need to be specifically designed for the objects and display environment that they are to protect and our specilist team are experts in this field.



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UV & IR Filtration

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Many artefacts are sensitive to light levels over a period of time and in particular damage can be caused by ultra violet and infra red radiation.

It is fundamental that cases should be shielded from natural daylight and this should be considered at the earliest stages of new building design. With the trend towards glass façades in contemporary architecture, secondary internal walling or screening systems may be required.

Measuring UV Content of Light

It is critical that diffusers have the same filtering capability top remove UV from lighting and light sources should have filters added to remove the infra-red component of the light that they generate.

We only use laminated glass to construct our display cases, this has a PVB interlayer which filters 97% of UV light within the wavelengths of 320 to 380 nanometres.

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Light Exposure

The intensity of light is measured in lux, with levels of 50 lux being specififed for the most light sensitive objects such as documents, textiles and entomology specimens.

Further research has identified that exposure time is a critical factor in damage from light and by reducing the length of time on display, light levels can be increased. This is achieved by timers or PIR triggers on lighting and by rotation of objects on display.

When the human eye has adjusted to very low light levels it is possible to have highly sensitive objects beautifully illuminated at safe lux levels, this is often achieved by gradually reducing lighting levels in galleries which will be negotiated by visitors in a pre-determined route.

Fibre Optic Lighting on Delicate Textile

Measuring Lux Level of Lighting

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Conservation Experts

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