CONSERVATION

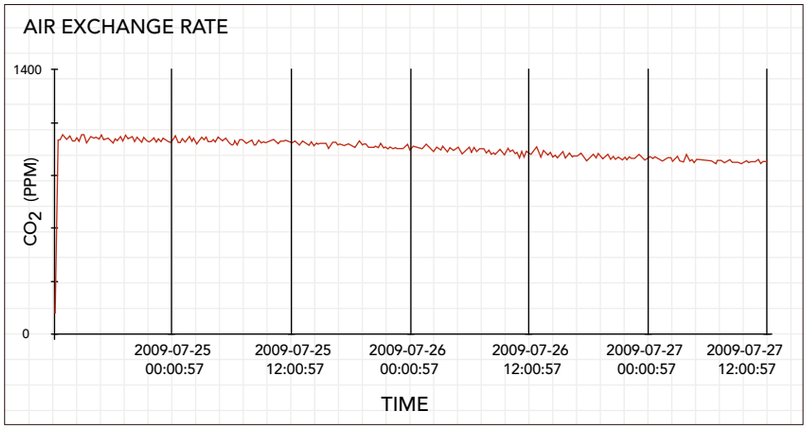
From inert materials to low oxygen environments, conservation is at the heart of our case design.

A STABLE ENVIRONMENT

Our showcases work hard. As well as keeping your exhibits secure and protecting them from physical damage, using inert materials and sophisticated sealing techniques, they provide a safe environment that can be controlled to keep exhibits in near perfect condition. Here's how we do it:

A SEALED DISPLAY

A well sealed display case is recognised as the best way to protect exhibits on display and this characteristic of a case can be defined and quantified by its Air Exchange Rate (AER).



A HISTORY OF AIR CHANGE TESTING

The V&A has always understood that a well sealed case is important. A sealed case keeps out dust and creates a manageable microclimate, protecting and preserving the exhibits inside. The Museum also realised that a low air exchange rate is an excellent indicator of build quality.

Working with the Building Services Research and Information Association (BSRIA), the Museum adapted a Nitrous Oxide (NO_2) air-tightness test used in the building industry to suit museum showcases and determined that an air exchange rate of 0.1 air changes per day (10%) represented the highest standard that could be achieved without dramatically increasing showcase production and testing costs.

Showcase testing is still provided by BSRIA, but many organisations now have their own air exchange testing equipment based upon an alternative test developed by Andrew Calver at The Museum of London using carbon dioxide (CO_2).

An AER of 0.1 is now regularly included 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 three key areas:

- Design – Using 3D CAD systems, we design a case to be inherently well sealed, utilising many years of experience.
- Manufacture – our sophisticated machinery and knowledge of production methods ensures that we can manufacture and assemble to the tightest tolerances.
- Installation – our experienced technicians use non-invasive testing methods on-site to ensure the integrity of their work.

TESTING OUR CASES

Our quality management team now regularly carry out CO_2 air exchange testing of cases at final assembly stage in our factory and on-site as part of our formal handover procedures.

CO_2 air exchange testing equipment

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.

INERT MATERIALS

The need for inert case materials is well known to museums because with exhibits sometimes sealed within cases for many years, it is important that the case environment does not contain pollutants that can react with and damage exhibits on display. For particularly sensitive materials like silver, activated charcoal cloth and other pollutant scavengers are used to remove any detrimental Volatile Organic Compounds (VOCs) from the environment or off-gassing from other exhibits.

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.

Light meter

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

LIGHT LEVELS

Many exhibits are sensitive to light levels over a period of time and in particular damage can be caused by ultraviolet and infrared 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.

The intensity of light is measured in Lux, with levels of 50 Lux being specified for the most light sensitive exhibits 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 exhibits on display.

When the human eye has adjusted to very low light levels it is possible to have highly sensitive exhibits 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.

THE ODDY TEST

To test a material, samples are placed in test tubes with copper, silver and lead, moisture is added and they are left in a warm place. A reactive test material will cause tarnishing of the metals.

WHAT THE TEST SHOWS:

Fail: bad tarnishing to all or some of the metal strips

Pass for temporary use: slight tarnishing to all or some of the metal strips

Pass: no visible tarnishing to any of the strips

STRUCTURAL & INTERNAL PANELS

There are many materials that can be used to construct your case. Each has strengths and weaknesses, so the following factors help us decide which materials to recommend:

- Conservation level (how sensitive is the exhibit?)
- Rigidity (do the internal panels need to support load?)
- Fixing (will the exhibits rest on the panel, or must they be secured?)
- Finish (some materials can support a wide range of finishes, while others cannot)
- Cost (can we supply the material within the budget you set us?)

Fully inert options include:

- Glass
- Powdercoated steel
- Aluminium honeycomb sheets
- Corian™
- Stone

With these materials it is important that exhibit mounting requirements are known prior to manufacture.

Timber sheet products (e.g. MDF or plywood) can be coated with inert sealants or aluminium barrier films, such as Moistop or Marvelseal, to seal in the VOCs, but this restricts your finishing and exhibit fixing options (you damage the seal if you puncture it, so it isn't possible to use pins or screws).

FINISHES

We use a range of water-based paints suitable for use in display cases, all of which have been tested and approved. If your case design calls for fabric finishes, both natural and synthetic fabrics can be suitable, and are bonded using a water-based adhesive and/or staples.

ENVIRONMENTAL CONTROL

The inside of a case is a microclimate. Like the ambient climate, its temperature and humidity can vary and these variations can seriously damage your exhibits. Our job is to design cases and case systems that keep these variations to an absolute minimum.

HUMIDITY

Humidity variation is a major cause of damage to exhibits and because temperature is inversely linked to humidity, temperature changes will also directly affect the humidity level within a case.

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, we can provide two alternatives:

PASSIVE ABSORBERS

Silica gel, Artsorb™ and Prosorb™ are hygroscopic materials. This means that they absorb moisture from the air. We recommend 1kg of conditioning material per cubic metre of case volume (i.e. a $3m^3$ case would need 3kg of conditioning material).

Conditioning materials need to be monitored and re-conditioned, though with larger volumes of conditioning materials equivalent to 10% of the case volume, it has been shown that no maintenance of materials was required.

INTERNAL PANELS	COMPARISON			FINISHING OPTIONS		
PANEL TYPE	INERT	MOUNTING	COST	PAINT	FABRIC	NEXTEL
ZF MDF	NO	YES	LOW	YES	YES	YES
ZF MDF WITH DACRYLATE	NO	YES	LOW	NO	YES	NO
ZF MDF WITH MOISTOP	YES	NO	MEDIUM	NO	YES	NO
GLASS	YES	SPECIAL	MEDIUM	SPECIAL	NO	NO
METAL SHEET	YES	SPECIAL	MEDIUM	POWDERCOAT	YES	YES
ALUMINIUM HONEYCOMB	YES	SPECIAL	MEDIUM	YES	YES	YES
CORIAN™	YES	SPECIAL	HIGH	NO	NO	NO
STONE	VARIES	SPECIAL	HIGH	NO	NO	NO

The conditioning material is usually placed in a locked tray beneath the showcase, with a ventilation route into the body of the case. This ventilation route is critical to the effectiveness of the case conditioning and the best results have been achieved with perforated metal base sheets wrapped with fabric. Where large exhibits cover these we utilise a perimeter gap around the baseboard and, in exceptional circumstances, a fan can be introduced to force ventilation.

ACTIVE HUMIDITY CONTROL

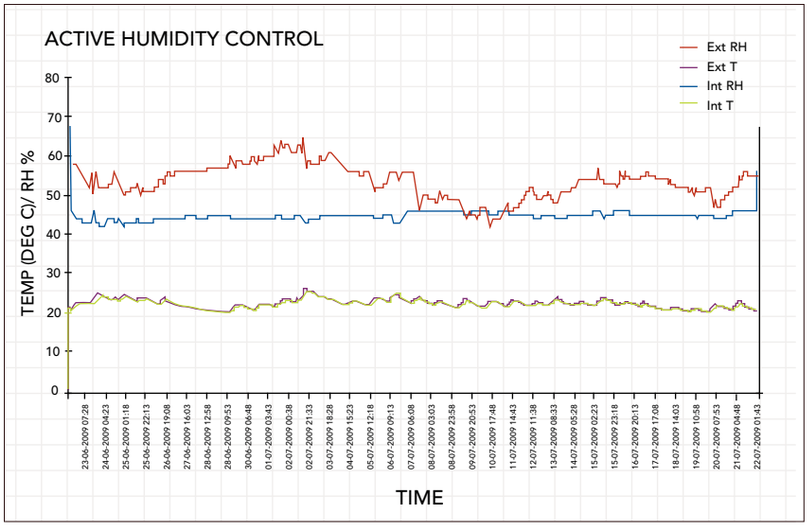
Where you need conditions inside the case to be significantly different from the ambient, or where ambient humidity changes more quickly than passive conditioning materials can handle, you need an active humidity control system.

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%.

TEMPERATURE

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.

It is possible to control temperature within a showcase that is specially constructed with insulated sides and is double glazed, but it is not common, as there are usually more cost effective methodologies to be considered.



GUIDELINES

This information is intended as a general guide to current practices. All exhibits have unique conservation requirements, and you should consult your conservation team right at the beginning of your showcase project. Further information and advice is available in the UK from Museums, Libraries and Archives Council, MLA.

GIVE IT TIME

IT CAN TAKE SEVERAL DAYS FOR THE ENVIRONMENT WITHIN YOUR CASE TO STABILISE, PARTICULARLY IF IT CONTAINS WOODEN OR ORGANIC EXHIBITS WITH LARGE VOLUMES

Active humidity control unit

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.

LOW OXYGEN ENVIRONMENTS

There are certain exhibits that require exceptional environments. These can include nation-defining documents, mummies or asteroids from outer space.

The environmental control systems for these cases will control temperature and humidity, reduce oxygen levels through nitrogen generation, sterilise bacteria and filter pollutants.

These systems are defined by restrictive showcase design, small display volumes, large plant areas, multiple backup systems, long development lead times, high budgets and specialised monitoring equipment to verify performance.