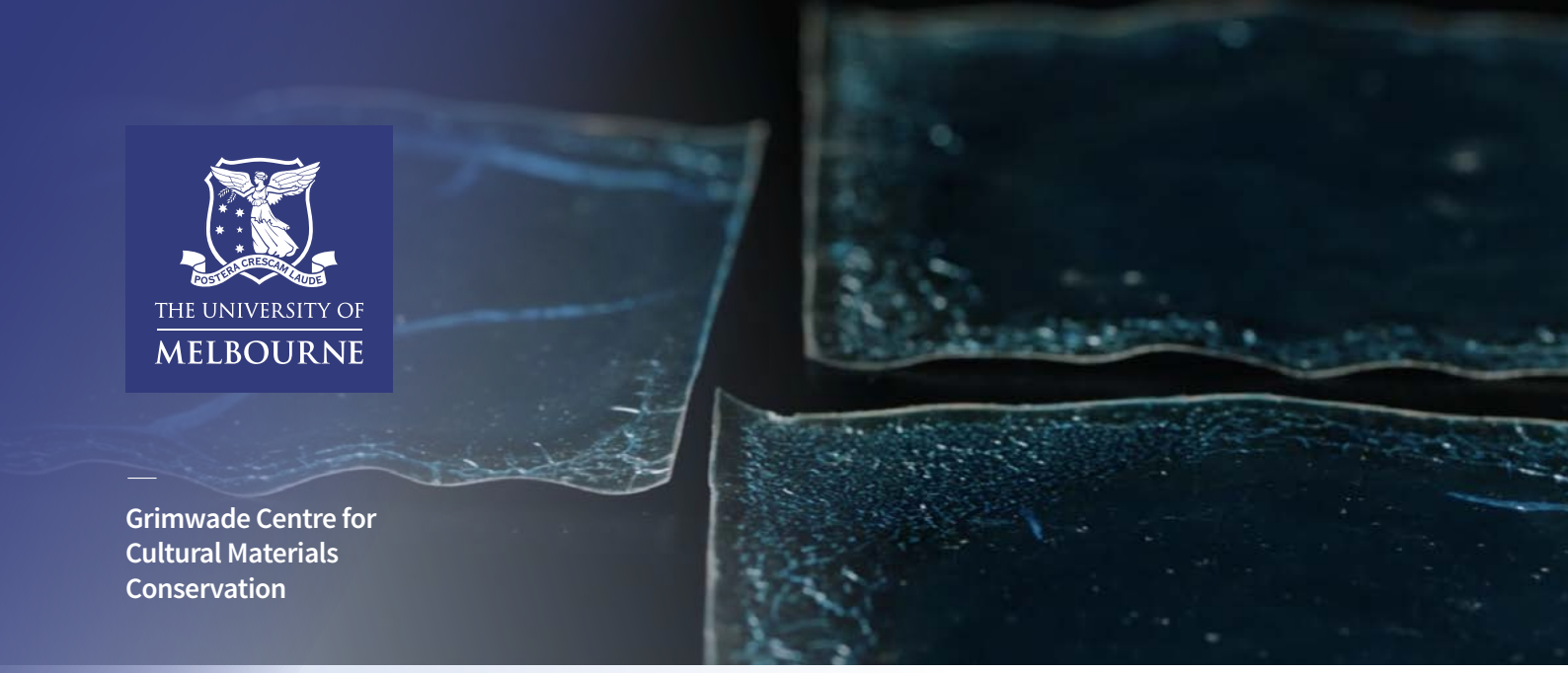

THE UNIVERSITY OF MELBOURNE

Grimwade Centre for Cultural Materials Conservation

TEMPERATURE AND RELATIVE HUMIDITY

The control of temperature and relative humidity is critical to ensure preservation of cultural objects. Temperature and relative humidity are linked in an inverse relationship. Typically, as one goes up, the other goes down. Prolonged and/or varied exposure to extremes in temperature and humidity can result in irreversible damage to cultural objects.

Control of temperature and relative humidity plays an important role in reducing deterioration caused by chemical changes, physical changes and biological damage.

At high temperatures, chemical reactions and the rate of natural ageing increases. Biological activity will also increase.

Generally, relative humidity is of more concern, as damage from poorly controlled humidity levels results in more immediate damage.

Relative humidity is the percentage of water vapour in the air. When humidity is high, it causes a damp environment. Objects can expand or lose shape, photographs can swell and stick to glazing in frames, and metals can corrode. When high humidity is combined with high temperatures, mould can grow quickly and insects can thrive.

When humidity is low and the environment is dry, moisture can be drawn out of objects, particularly organic objects such as wood, rubber, leather or plant fibres, causing them to become brittle, crack or split.

Rapid fluctuations in temperature and humidity puts stress on objects. Stress can cause objects to expand and contract, warp or shrink as the moisture in the air changes. The more frequently this occurs, the more damage can be caused. Therefore, attempting to maintain a stable environment is preferable.

In the museum environment conservators measure temperature and humidity over time with a thermo-hydrograph or a data logger. These devices measure moisture in the air and temperature.

RESOURCES

reCollections
Caring for Collections Across Australia – Handling, Transportation, Storage and Display, Heritage Collections Council, available online: http://go.unimelb.edu.au/36wi

A Practical Guide for Sustainable Climate Control and Lighting in Museums and Galleries, Australian Museums and Galleries Association, available online: http://go.unimelb.edu.au/k4wi

Caring For Your Paintings - Agent of deterioration: Incorrect Relative Humidity, Canadian Conservation Institute Notes, available online: http://go.unimelb.edu.au/6mwi

Bickersteth, J, 2014, 'Environmental conditions for safeguarding collections: What should our set points be?', Studies in Conservation, vol. 59, no. 4, pp. 218-224.

RECOMMENDED TEMPERATURE & RELATIVE HUMIDITY LEVELS

It is important to consider the environmental conditions relevant to your location. As a stable environment is the goal, aim for a range that can be maintained 24/7. Current guidelines are:

- Temperature: between 15–25°C with allowable fluctuations of +/-4°C per 24 hr. Some items, such as film, is more stable at cooler temperatures.
- Relative humidity:
  - » Hot, humid locations, aim for 55-70% relative humidity, with allowable fluctuations of +/- 5% per 24 hr
  - » Temperate locations, aim for 45-65% relative humidity, with allowable fluctuations of +/- 5% per 24 hr
  - » Hot and dry locations, aim for 40-60% relative humidity, with allowable fluctuations of +/- 5% per 24 hr

MANAGING TEMPERATURE AND RELATIVE HUMIDITY

To reduce the impact of temperature and relative humidity fluctuations, the following is recommended:

- Measure your environment over an extended period and aim to keep it stable.
- Establish upper and lower limits: 40 – 70%
- Maintain good ventilation with fans or air conditioners.

It is important to note that while air-conditioners, dehumidifiers and heaters assist in the management of the internal environment – they are not without their faults. They require ongoing maintenance, upgrading and have associated operational costs.

Recommendations for passive environmental control include:

- Store objects in a central location within your building to help regulate humidity through building insulation.
- Seal external doors and windows.
- Install blinds, curtain, shutters on windows.
- Create a microclimate by housing objects in boxes, cupboard, drawers or framing with glazing and backboard.
- Consider repacking objects to buffer from the environment and include desiccants such as silica gel pouches to absorb moisture in the air.
- A surrounding garden, well maintained, can assist in insulating the building through shading. Gardens must be maintained so they are not transferring moisture to the building via unrestricted growth or watering cycles

SUMMARY

Maintaining a stable environment by controlling the temperature and relative humidity will reduce rapid deterioration of materials.