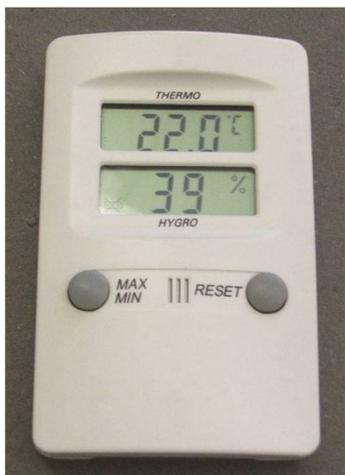




Monitoring storage conditions informs preservation measures

This sheet will outline:

- effects of poor conditions;
- recommended ranges;
- monitoring devices;
- data recording;
- control measures.



Environmental monitoring involves measuring and recording the temperature and relative humidity in collection storage areas. The information can be used to help control their levels and fluctuations.

Temperature affects the rate at which collections deteriorate; cooler temperatures help preserve them for longer. Humidity influences whether items are too damp or too dry; damp collections are susceptible to mould and insect damage; very dry conditions can make paper brittle.

Relative humidity

Relative humidity (RH) describes the moisture content of the air as a percentage of the maximum it can hold. Warmer air is able to contain more moisture than cold air; there is more moisture in a warm room at 50% RH than a cool room at 50% RH. Humid air may reach its *dew point* (100% RH) on a cold surface such as a window or if the temperature drops sufficiently.

It is important to understand the relationship between temperature and relative humidity when monitoring a storage area; **as one rises the other falls** if the moisture content (absolute humidity) of a room remains the same. On a graph, these display a mirror pattern.

Recommended levels

Cool, dark and dry conditions are advisable to promote long term preservation of archive material. **PD5454:2012, Guide for the storage and exhibition of archival materials**, available through the British Standards Institute explores this in more detail. It recommends storage with a temperature range of 13 to 20 degrees Celsius and relative humidity between 35 and 60%.

Significant fluctuations in both temperature and humidity are also undesirable. The recommendation is that temperature should not vary more than two degrees, or 5% relative humidity in a day.

These levels can be difficult to maintain in some storage areas. It may be that stable conditions that are slightly outside the ideal parameters are preferable, or more realistic to achieve than those that fluctuate within the ranges. Good packaging will also buffer actual items against fluctuations in the air space.

Monitoring devices

Relative humidity and temperature can both be measured with a **thermohygrograph**. Now mostly digital in format, there are three main types:

- The most sophisticated and expensive monitors continuously record data which is either transmitted or downloaded and



interpreted using software;

- Stand-alone monitors are useful to place on a shelf, or in a display cabinet. Some will give maximum or minimum readings as a guide to fluctuations;
- Hand-held monitors are usually more sensitive and are switched on and off as required for a spot check. Some have a probe which may be detached and placed inside a box while a reading is taken.

High levels of accuracy are not usually necessary, but monitors should be reliable and calibrated. Devices can be sent for re-calibration and certification on an annual basis but it may be cheaper to buy a new one. Check that the specification is suited to range required.

Taking readings

Measurements may be taken as spot checks or at set intervals continuously (half hourly readings will give a good data set). Spot check readings can be taken on a daily, weekly or monthly basis, Regularity is important to spot patterns.

Recording data

Spot checks: taken with a hand-held or stand-alone monitor, readings may be taken in different areas of the storage area, particularly if there are damp spots to be monitored.

Spot checks may be recorded manually then transferred to a computer from which graphs can be drawn. Print outs are also useful to keep and computer data should always be backed up.

Spot checks are simple and easy to do and enable quick checks. It is a very flexible method of monitoring. However they do not give a whole picture of the storage environment; for example if the temperature is dropping significantly at night and causing the humidity to fluctuate.

Continuous monitoring: data will build a picture of conditions in the storage area and patterns are easier to spot. Devices can be left in problem areas or even in a box. However, technical hitches such as batteries running out will result in loss of data.

Environmental control

If the storage area is showing signs of damp, first check for problems such building issues. The humidity can be reduced by using a dehumidifier or raising the temperature very gently with a low energy heater. Ventilation and air circulation can also help. Excessive dryness can be alleviated with a humidifier and high temperatures with a mobile air conditioner. Consider the energy use, health and safety and fire risk aspects of any control strategies.