“In and Out Air Strategies. From Climate Change to Microclimate. Library, Archives and Museum Preservation Issues”

5-6 March 2009

Bibliothèque nationale de France

http://www.ifla.org/VI/4/pac.htm
British Library Low Oxygen Case Study
The Future of Fire Prevention in Archival Storage

Bibliothèque nationale de France
5-6 Mars 2009

John de Lucy
Head of Estates and Facilities
The British Library
The British Library at St Pancras, London
The British Library Centre for Conservation
The British Library Centre for Conservation – conservation studios
Additional Storage Programme (ASP) Brief for construction

- 262 kilometres storage (should last until 2016)
- High Density, High Bay, fully Automated, controlled environment
- Low oxygen (15%) fire prevention
- High sensitivity smoke detection systems
- Temperature 16°C Relative Humidity 52%
- Two separate four hour fire compartments
- 70 year design life
- Energy efficiency / sustainability
- Minimal environmental impact
The ASP building
ASP aerial view
Additional Storage Building, Boston Spa
ASP construction: interior prior to racking installation

PAROC mineral wool composite panel cladding

4-hour fire rating

Racking 70 feet tall

Crane aisles 2.6 feet wide
Additional Storage Building – high bay, high density racking
Fire Protection in UK Archives – the received wisdom

British Standard 5454:2000

- Sprinklers
- Fire compartments
- 4-hour protection
- Smoke extraction
- Reactive model (thermal trigger): fire is a prerequisite

The reality

- Risk of accidental or partial water discharge
- Freezers to salvage wet books
- For some: no fire suppression at all
- Inefficient building design
Why sprinklers did not suit ASP

- Sprinkler heads required at all 25 levels of racking
- Fire Compartments incompatible with efficient automation and HD building design
- How maintain sprinkler pipes in racking (up to 70 feet in height)?
- Totes fill with water, books are immersed, racking buckles..?
Low Oxygen (OxyReduct)

OxyReduct used in mainland Europe by the Gas, Oil, IT, and Chemical industries

Used where water would cause more problems

Approved by European fire institutes and insurance bodies
Benefits of Low Oxygen

- Preventative model: reassurance to collection specialists
- Nitrogen is an inert gas: no effect on paper-based collections
- Ideal for new build with automation
- Proven effectiveness in preventing fire
- Early detection of even non-visible pyrolysis
- Continuous monitoring throughout storage space
- Assets are protected for min. 72 hours even if OxyReduct system fails catastrophically
- Simple to install and maintain
... not for everyone? Issues in legacy buildings
Groningen University Archive
Further investigation & risk assessment

Hugo Boss cloth warehouse
Germany

2002: two cloth storage warehouses with sprinklers

2004: single cloth storage warehouse with OxyReduct

Hugo Boss not viable if cloth stocks lost to fire

Building holds next 3-4 years’ of stock
Implementation at the British Library: specification

- 15% Oxygen level throughout storage areas
- Independent parallel air sampling Vesda system
- Nitrogen tanker port
- 3 Nitrogen compressors: 2 online, 1 standby, all 3 in emergency
- Building Air Leakage Index specification value: 0.5. Achieved 0.17
Implementation: building air tightness

Hammersens, Osnabruck

PAROC air test box:
- 4 metres square
- 400mm thickness
- 4-hour fire resistance
- High thermal capacity
- ASP: 11 KM of joints

Air Leakage Index value of 1 =
1 cubic metre of air leaking through
1 square metre of building envelope
in 1 hour
Installing High Bay, High Density 21 metre Racking
Installing High Bay, High Density 21 metre Racking
Picking stations
Conveyor System
Visitors’ Viewing Gallery
Totes in Loading Bay
Crane in Aisle