Cable Fire Behavior and Testing in the Built Environment

J. Thomas Chapin, Ph.D. – Lucent Technologies, Bell Laboratories

Underwriters Laboratories Inc.®

Lucent Technologies
Bell Labs Innovations

The Built Environment

Requirements
- *National codes*
- *Local codes*
- *Standards*

Building Owners & Managers

Business Continuity

AHJs (Code Enforcers)
- *Fire chief*
- *Fire marshal*
- *Code officials*

Construction Industry
- *Architects*
- *Contractors*
- *Engineers*

Insurance Companies
- *Property Loss prevention*

Conformity Assessment

- **Communication Systems**
- **Building Products and Furnishings**
- **Resistance**
- **Suppression**
- **Research**
- **Detectors & Alarms**

Manufacturers of Fire Safety & Security Equipment

Consumers
Life Safety

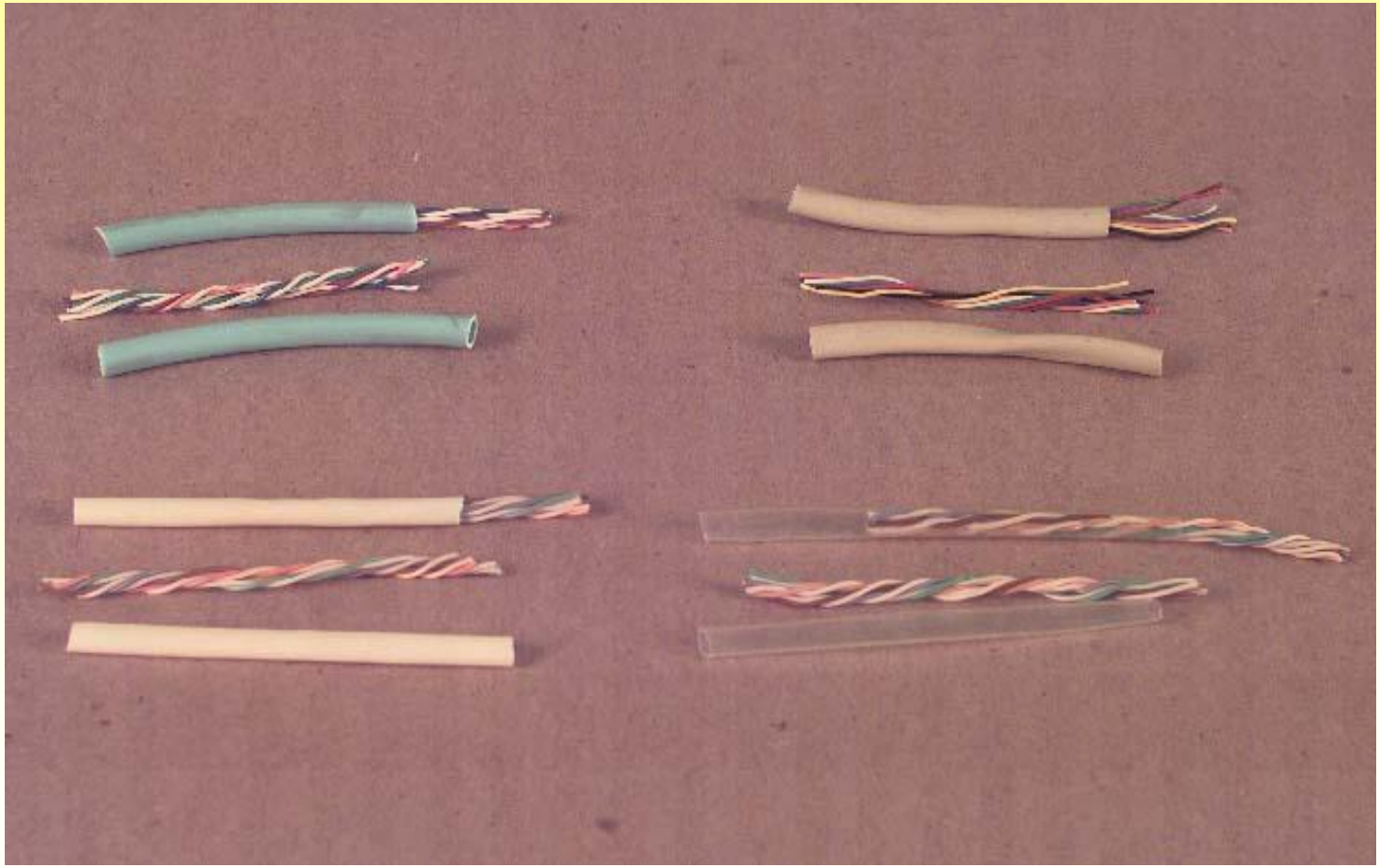
Fire Services

Underwriters Laboratories Inc.®

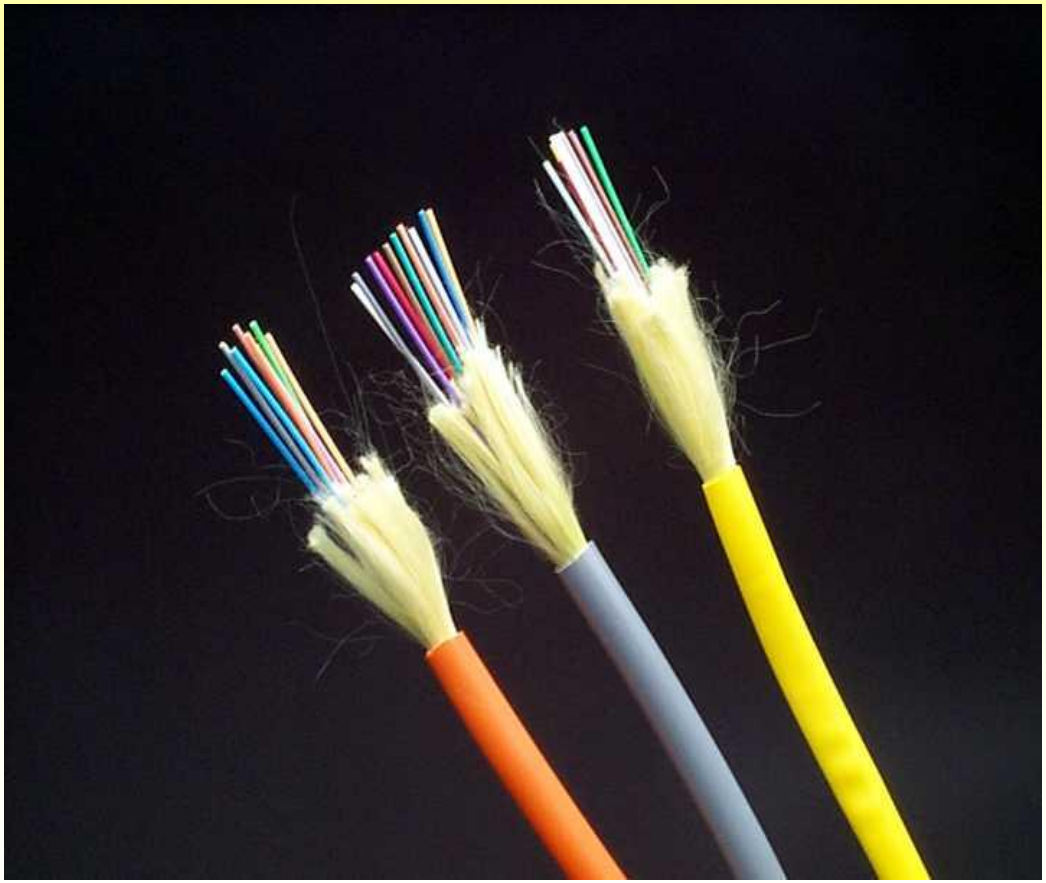
Rationale for Cable Investigation

- Increased installation of data cable and structured wiring in buildings (**20 billion feet** of cable was installed in buildings in the US in 2003).
- Cable often not protected by metal conduit.
- **Abandoned cable** accumulating in buildings.
- Changing **construction practices** for buildings.
- **Harmonization** of world fire standards.
- Recent **fire disasters** in buildings.

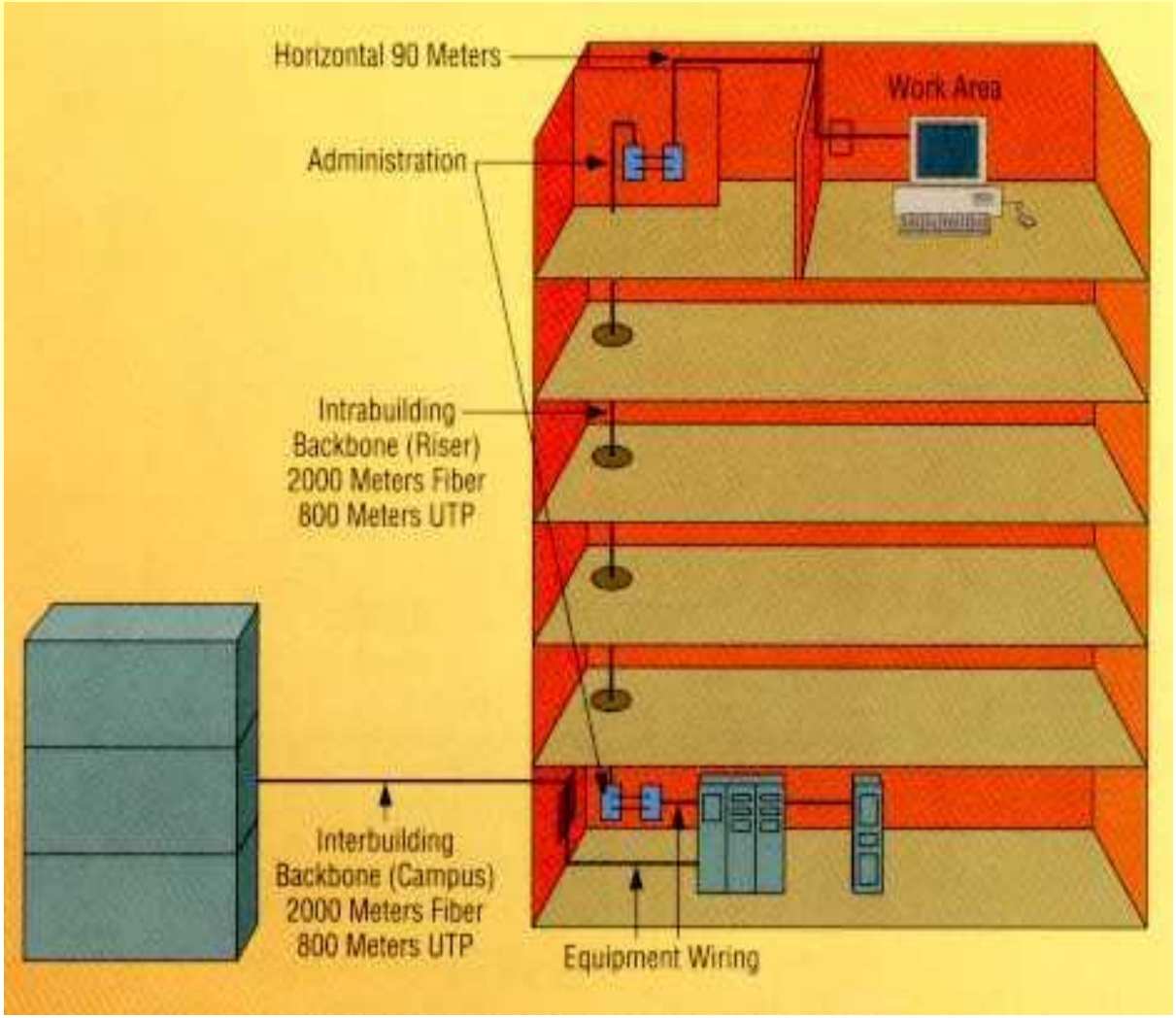
Copper Telecommunications Cable



Fiber Optic Local Area Network Cable

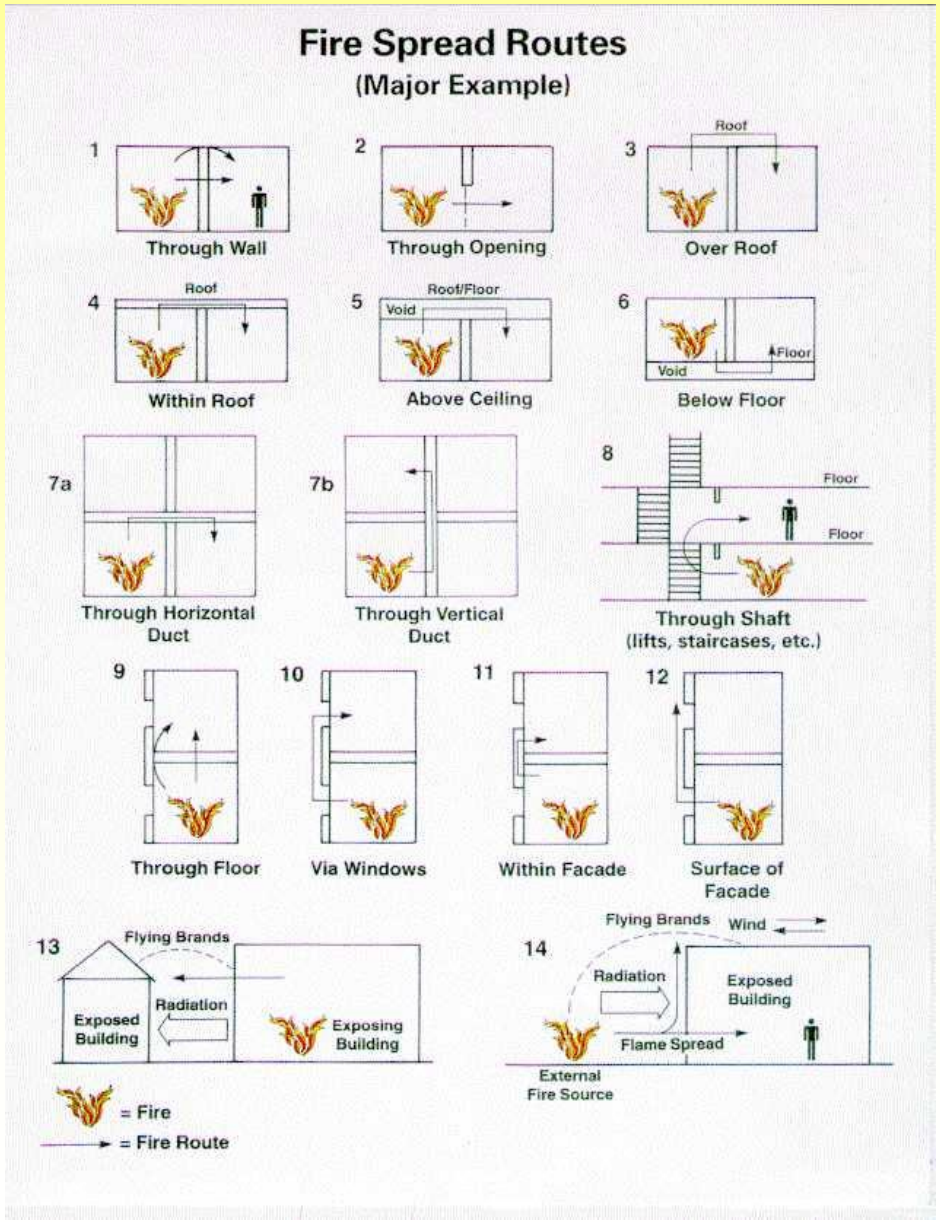


Structured Wiring Concept



Indoor cable covered by NFPA 70, National Electrical Code

ISO TC 92 Routes of Fire in Buildings



Credit Lyonnaise Bank Fire

Thailand Office Fire

Düsseldorf Airport Fire

Heathrow Airport Fire

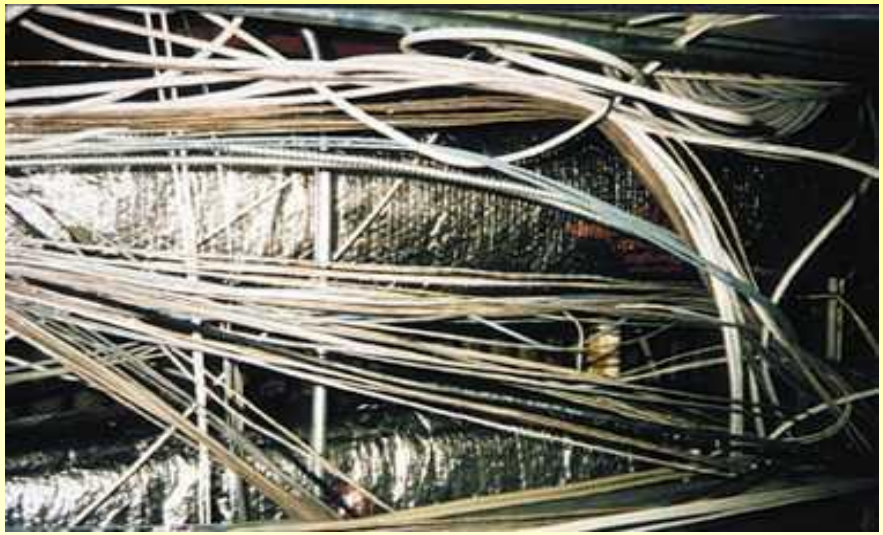
Steel Beam Deformation after Cable Fire Test

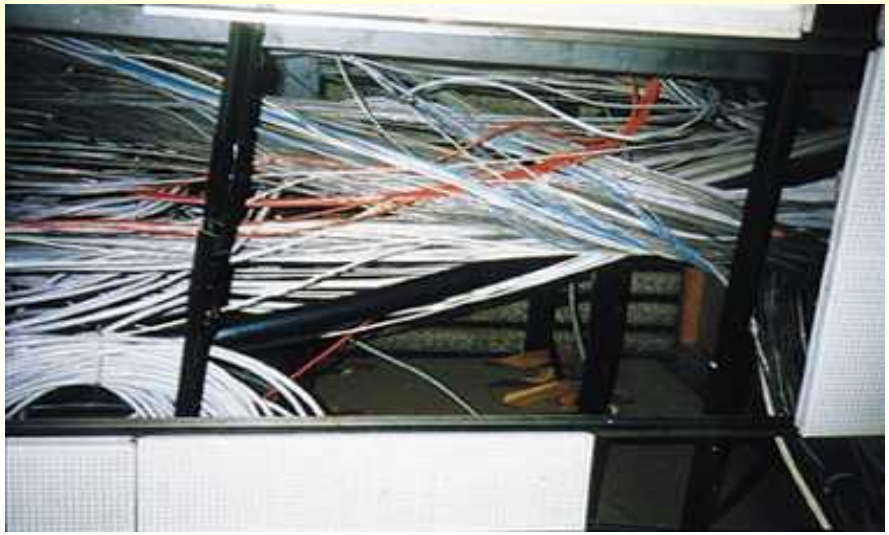
Building Cable Inspections

Telecom and energy cable installations

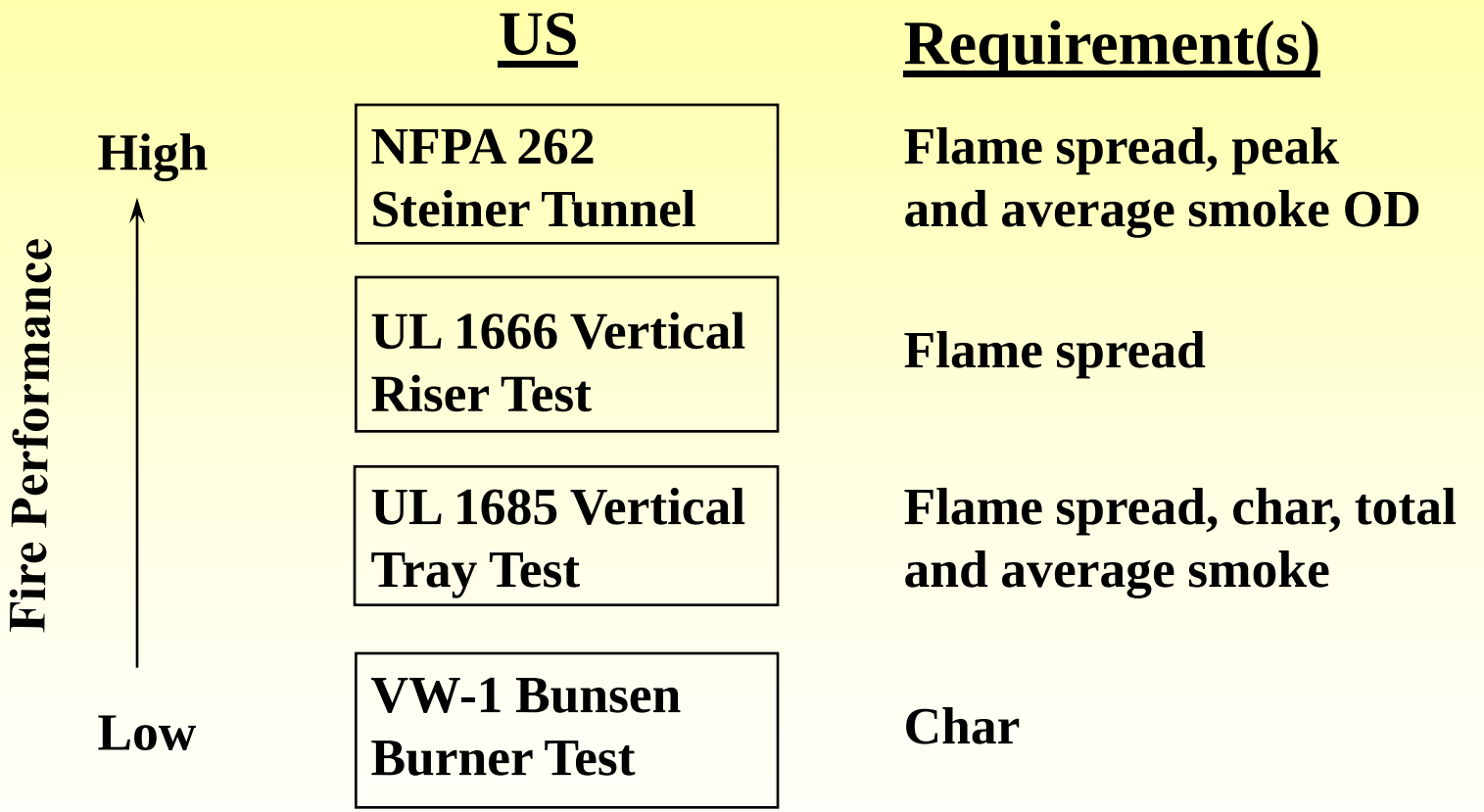
Building Cable Inspections

Building Cable Inspections





US Cable Hierarchy



Horizontal Plenum Cable Fire Test

<u>Requirements:</u>

Flame spread

Peak and average smoke

Vertical Cable Fire Tests

Requirements:

Flame spread

Char

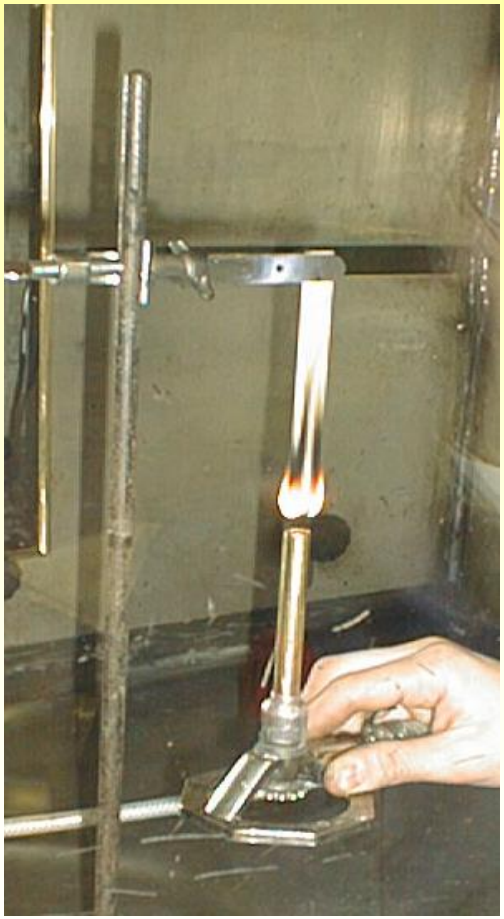
Total and average smoke (optional)

Vertical Cable and Wire Tests

<u>Requirements:</u>

Flame spread

Char



Assessment of Cable Infrastructure in Buildings

- Fires propagate through buildings by different routes:
  - Horizontal paths through concealed ceilings and floors
  - Vertical paths through riser shafts
  - Open areas within rooms and hallways
- Cable fire performance should reflect the installation hazard.
- Cable network design can accommodate different fire performance levels (cost and functionality).

Key Conclusion – put the right cable in the right place