



# What the heck is a 'Furniture Calorimeter'?

by David Pearson, Manager Fire and Explosion & PPE Branches

## *New fire testing instrument at TestSafe*

A Furniture Calorimeter is a fire research and testing instrument, which allows the measurement of a number of important fire properties of materials and furnishings. These include how much and how quickly heat, smoke and flame are produced, and where and how the flame spreads across the surfaces of furnishings.

It is an important tool used to provide actual fire hazard data for the furnishings used in workplaces, theaters, auditoriums, hotel rooms, hospitals etc. This data is then used in computer-based models of smoke propagation within buildings to ensure that occupants have sufficient time in which to evacuate safely.

### FIRES IN ROOMS

When fires occur in enclosed spaces such as a room or an office, the toxic smoke produced by the fire can fill the room very quickly. This smoke can disable, disorientate and kill persons within. The



*Full scale (2.4 x 2.4m) Furniture Calorimeter testing of burn patterns on parquetry floor by US National Institute of Justice*



*Furniture Calorimeter Hood (1.2 x 1.2m) commissioned at TestSafe for Masters Project*

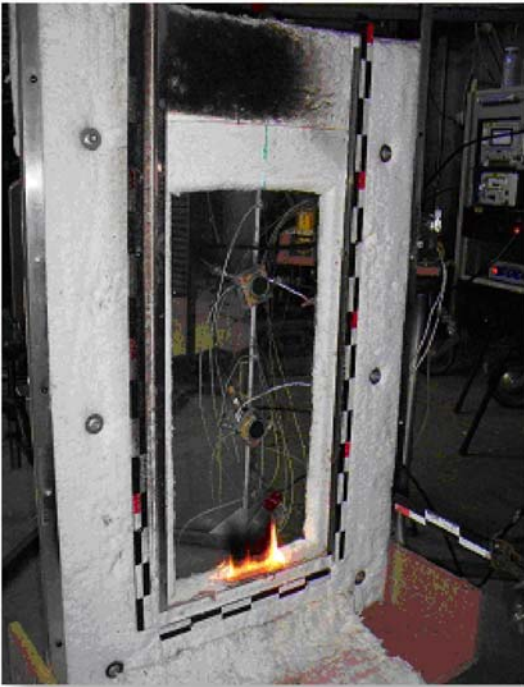
plastics and polyurethane foams used in soft furnishings can produce cyanide, hydrochloric acid laden smoke that makes the smoke even more deadly.

Adding to this hazard is that modern homes and workplaces often contain far more flammable materials than was ever envisaged when previous generations developed Building Codes. These include wooden and synthetic materials, furniture, fabrics, computers and other electrical appliances.

These contribute to a far greater total fire risk due to the large "fuel load", the rapidity with which fire can spread over some of these furnishings, and the reduced time available for occupants to escape because of the toxicity of the smoke.

### MASTERS RESEARCH PROJECT

Recently, as part of my University of NSW Masters Degree course in Fire and Explosion Management, I constructed a



*Ignition of a vertical sheet of clear Perspex*

Furniture Calorimeter at TestSafe in order for me to undertake a final research project subject. This work was undertaken entirely in my own time and the Furniture Calorimeter was constructed at my expense.

Rather than burning real furniture, the project was much more fundamental involving several burn tests conducted upon a number of clear Perspex sheets held in the vertical orientation.

#### OUTCOMES

This important data already been successfully used by the University of NSW to develop a properly validated computer model of flame spread.

TestSafe has gained a potential source of research and testing revenue.

It also allows TestSafe to be able to comply with upcoming changes to standards for fire propagation testing of electrical cable insulation.

I am personally very proud to have been able to commission this instrument. It recovers expertise lost to TestSafe some years ago when two senior staff members resigned.

The knowledge gained allows me to undertake full-scale fire research in the Fire Gallery, and to commission a new Cone Calorimeter bench scale material flammability instrument.



*Vertically propagating flame over a sheet of Perspex*

---

#### ACKNOWLEDGMENTS

I am most grateful to have been able to undertake this work at TestSafe and be given access to some of TestSafe's instrumentation.