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The National Research Council's fire research laboratory in Almonte, ON is the only one of its kind in Canada.

FOCUS | Building envelope

Exterior claddings face trial by fire

PETER KENTER
correspondent

Putting out fires is just a routine day at the office for Bruce Taber. But the trick to his job is not to jump in too quickly with the extinguishing solution. He likes to see things get really hot before pulling the plug.

Scorching things beyond recognition is all in a day's work for the head of the National Research Council's fire research laboratory in Almonte, Ont.

It's here, in the affectionately named 'Burn Hall', that NRC teams research the fire performance of non-load bearing exterior wall cladding materials and systems according to National Building Code standards.

It's currently the only facility in Canada that can provide NBC material testing for exterior wall materials.

"I was offered a couple of jobs in testing building materials when I started here," he says of his hiring 27 years ago.

"I chose this position because the whole concept of burning things is a lot more interesting to me than breaking concrete cylinders into tiny pieces.

"In this job, you never do the same thing twice."

It's the second NRC facility to offer these services. The first fire research laboratory was built in the 1950s in what was then a rural area outside of Ottawa. By the late 1970s, the facility was surrounded by apartment buildings. A new facility was built in Almonte in 1980.

"It's far enough out that it will never be an impediment to real estate development," says Taber. "It's surrounded by 200 acres of farmland which we lease out to a neighbouring farm. We have horses grazing just outside."

Inside the lab, cladding materials are affixed to a three-storey reinforced concrete block wall overlaid with a half-inch of Gyproc. "The original concrete wall has served the facility for almost 30 years," says Taber.

"We'll have to replace it eventually when we've drilled so many holes to mount the cladding material that there's nothing left for anchors."

Propane burners generate flames that are directed to the exterior of the wall through an opening that simulates an open window. Instrumentation carefully controls and records the amount of propane fed to the flames, so that each test can be repeated accurately.

Two large-scale calorimeters measure the total amount of heat generated by the fires.

It's not the same as measuring the temperature of the flame. A single match flame may heat briefly to 1000 degrees Celsius while a roomful of burning furniture may never reach that temperature, explains Taber.

A calorimeter measures the total energy generated over the length of the burn in kilowatts or megawatts.

Materials tested can range from composites, such as urethane foam covered with cementitious decorative material to aluminum sandwich panels. Non-flammable materials such as brick and glass block aren't tested here.

The fires can be large, even for materials that pass the test — much larger on the rare occasions when one of the cladding materials fails the fire test.

Taber and his research team often watch the tests through a window in an observation room adjoining the laboratory as video cameras record the action.

"We can stay inside Burn Hall if the material being tested doesn't produce any nasty smoke," says Taber. "The Hall has quite a high ceiling and the smoke largely stays there."

An adjoining facility features a 10-storey tower designed to test smoke movement in full-scale staircases and elevator shafts, although occasional building material tests are conducted there as well.

Other fire research provided at the facility has included the testing of pressure relief valves used on alcohol storage tanks for the Association of Canadian Distillers, and testing of non-halon fire extinguishing systems for the Canadian military.

One of the team's highest profile assignments, performed about 20 years ago, involved fire-testing custom-made doors used on Parliament Hill.

"It's not as though a set of beautiful doors like this could be purchased with a ready-made ULC listing," says Taber. The research team used a sacrificial set of the fully finished custom oak doors to see whether they met the ULC standard.

"We certainly burned up a very nice set of doors to deliver that rating," says Taber.



ALL IMAGES: NRC

Materials tested at the fire research laboratory can range from composites, such as urethane foam covered with cementitious decorative material, to aluminium sandwich panels.



The lab also tested custom doors used on Parliament Hill.