Pentronic has worked with Professor Ulf Wickström at Luleå University of Technology to develop a thermocouple that measures adiabatic surface temperature, which is the weighted mean temperature of the gas temperature and the radiation temperature. The radiation temperature or the incident radiation can then be calculated when we know the adiabatic surface temperature and the gas temperature.

THE NEW SENSOR is a Plate Thermometer Heat Flux Meter.

A few sentences to illustrate the difference:

A fire doesn't care what the gas temperature alone is. The fire spreads when a sufficiently high adiabatic surface temperature has developed on combustible surfaces.

The difference between being in the sunshine or in the shade on a warm summer's day depends on the differing radiation temperatures. The air temperature is the same but the radiation means that surfaces in the sunshine become much hotter.

The measuring method is based on the results of fire research done at the research institutes RISE, until recently SP,

"That sensor is now standard equipment in fire research but is designed for measuring high temperatures in furnaces."

in Borås, Sweden. Ulf Wicksröm is SP´s former director for the department of fire technology and 20 years ago he worked with Pentronic to develop a similar sensor for taking readings in furnaces.

"That sensor is now standard equipment in fire research but is designed for measuring high temperatures in furnaces," he says. "There is a need for doing similar measuring at lower temperatures."

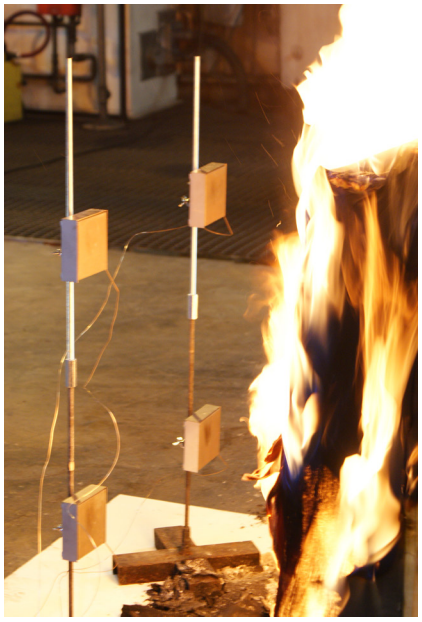
In order for the innovation to be comprehensible, the concept of adiabatic surface temperature must be explained. Ulf Wickström uses a metaphor:

"If you go outdoors on a lovely summer's day you experience radiation from the sun. In the shade of a tree you feel the gas temperature but not the radiation from the sun. The adiabatic or effective temperature is a combination of the radiation temperature and the gas temperature."

The adiabatic surface temperature determines if combustion will occur and if a fire will spread.

A similar concept exists: heat flux or heat flow. It is measured using sensors that require water cooling and that are expensive and awkward to use, especially in the field. This is the background of the current development programme.

"We've developed a sturdy plate thermometer that takes readings based on Ulf Wickström's theories," explains



Picture from a fire test.

Pentronic's project manager Christophe Zaninotti. "The construction has been carefully developed and the materials have been carefully selected to meet his criteria."

The actual thermocouple merely measures the temperature. With the aid of the product's design and a formula, the temperature can be recalculated to that of the incident thermal radiation. Pentronic is also developing an instrument that automatically does this calculation and immediately displays both the adiabatic surface temperature and the incident thermal radiation.

The equipment is initially intended to be used in fire research and in trainings/demonstrations for emergency services personnel. When doing tests, it is important to understand the effect of thermal radiation at various distances. Because the sensors are sturdy and inexpensive, they are also suitable for fixed installations for early warning of fire spread risk.

"There will certainly be other applications in the future but it takes some time to introduce a new temperature concept and a new measuring method," Ulf Wickström says.

More and more of Pentronic's customers are interested in measuring radiation temperature. It is relevant not only in the case of fires but also when measuring the indoor climate in both homes and vehicles. In these situations both cold surfaces and the sun's rays have a major effect on whether we experience the temperature as being colder or warmer than the air temperature.

The new sensor type is called a Plate Thermometer Heat Flux Meter (PTHFM).

Professor Ulf Wickström.

Christophe Zaninotti.