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Heat exposure in fire resistance test furnaces controlled by plate thermometers and by shielded thermocouples Sultan, Mohamed A.

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Heat Exposure in Fire Resistance Test Furnaces Controlled by Plate Thermometers and by Shielded Thermocouples

Mohamed A. Sultan
Fire Research Program



National Research
Council Canada

Conseil national
de recherches Canada

Canada

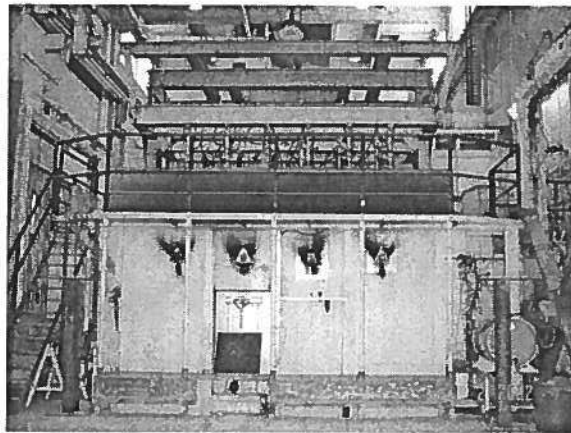
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Outline

- Introduction
- Experimental work
 - Plate thermometer
 - Shielded thermocouple
 - Heat flux sensor
- Results
 - Furnace temperature
 - Heat flux to specimen
- Conclusions

NRC Full-scale Floor Furnace

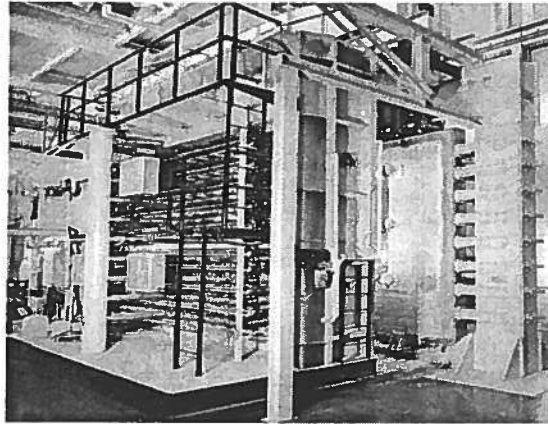


Full-scale Floor Test Specimen

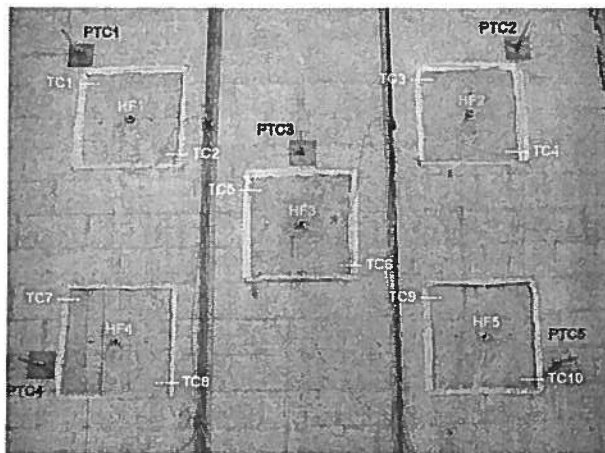


Sensor Location -- Floor Characterization tests

NRC Full-scale Wall Furnace



Full-scale Wall Test Specimen



Full-scale Wall Test Specimen Exposed Surface

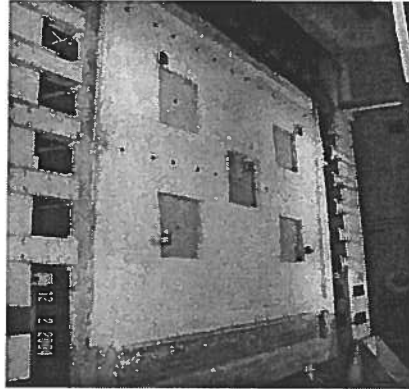
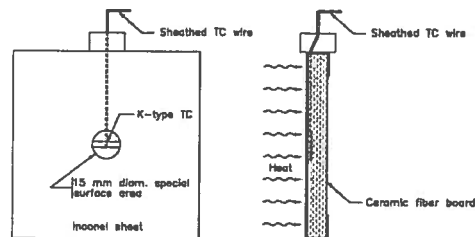
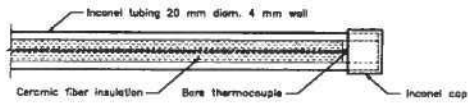


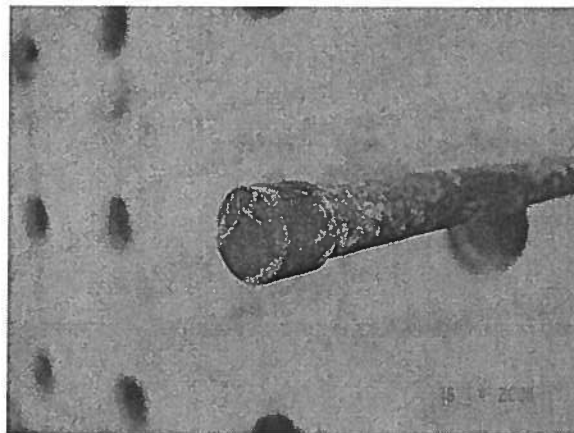
Plate Thermometer



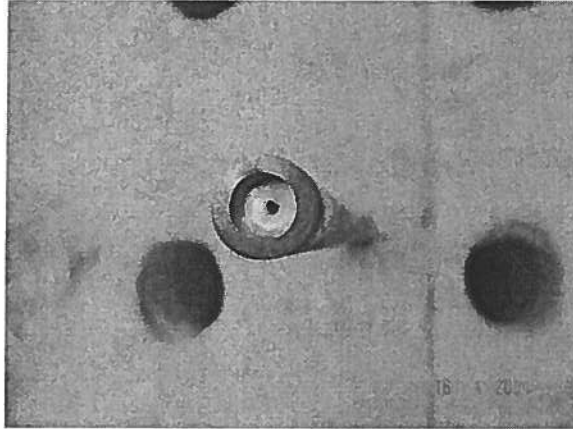
Shielded Thermocouples



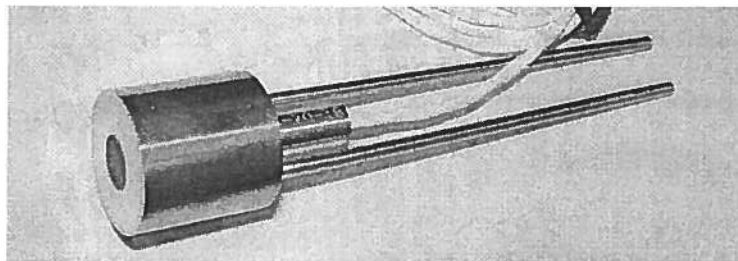
Shielded Thermocouples



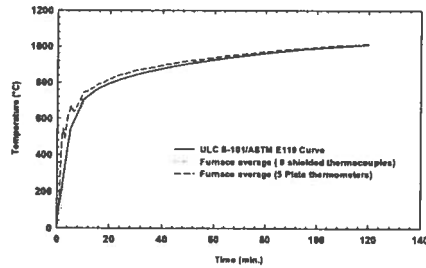
Shielded Thermocouples



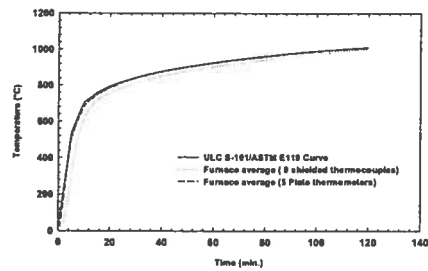
Water Cooled Gardon Heat Flux Sensor



Comparison of Floor Furnace Temperature

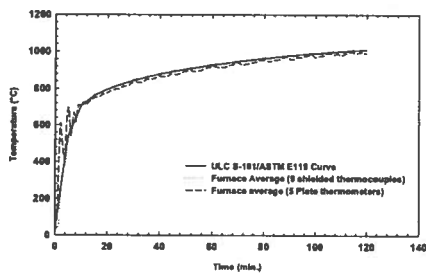


furnace controlled by shielded TC

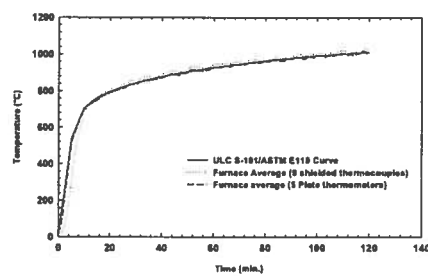


Furnace controlled by plate thermometers

Comparison of Wall Furnace Temperature

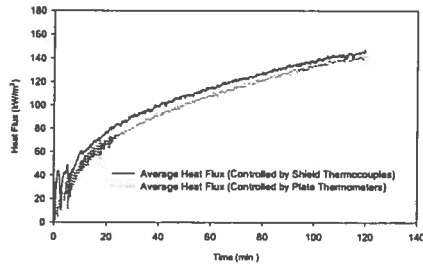


furnace controlled by shielded TC

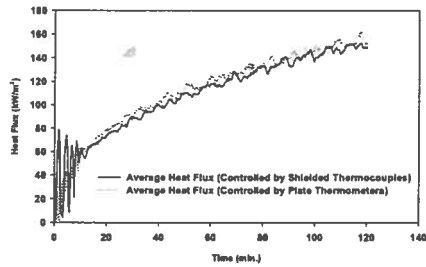


Furnace controlled by plate thermometers

Comparison of Heat Flux in Furnace

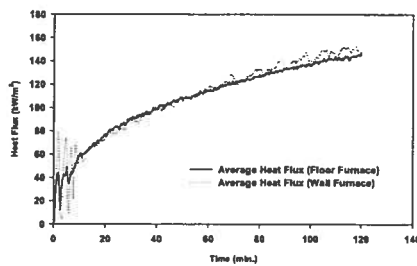


Floor Furnace

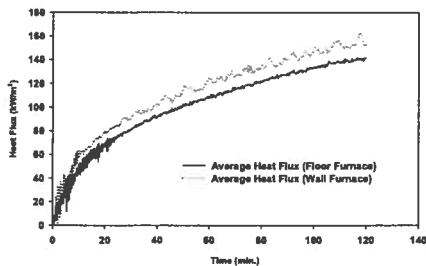


Wall Furnace

Comparison of Heat Flux in Wall and Floor Furnaces



Furnace controlled by
Shielded thermocouples



Furnace controlled by
Plate Thermometers

Conclusions

- Furnace temperature for or wall or floor furnace controlled by either shielded thermocouples or by Plate thermometers:
 - In the first 10 min, the difference in furnace temperature is significant
 - After 10 min, the difference in furnace temperature is insignificant

Conclusions

- Incident heat flux for wall or floor furnace controlled by shielded thermocouples:
 - For the initial 10 min, the specimen received heat flux peaks of up to 100% more than in furnace controlled by Plate thermometers
 - After 10 min, the specimen received heat flux up to 12% more than in furnace controlled by Plate thermometers

Conclusions

- For furnaces controlled by shielded thermocouples, the difference in the incident flux received by specimen in either wall or floor furnaces is insignificant
- For furnaces controlled by Plate thermometers, the specimen in wall furnace received 15% more incident heat flux than in floor furnace

Heat Exposure in Fire Resistance Test Furnaces Controlled by Plate Thermometers and by Shielded Thermocouples

QUESTIONS !

