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APPLICATION OF GEOPOLYMER AS A FIRE PROTECTION OF WOODEN BUILDINGS USING FOAMED GEOPOLYMER COMPOSITE

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- Materials and experiment details
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COMPOSITION OF THE TEAM



- This work aims at evaluating the performance under thermal loading of geopolymer composite for passive fire protection of the OSB panels.
- On the OSB were coated by geopolymers layer which 2 thickness sizes.
- Fire testing was conducted on the OSB panels 500 x 500 x 20 mm by flame of a gas burner into a furnace and the test was performed at the age of 21 days after the production of the specimens.



MATERIALS

Geopolymer product, supplied by České lupkové závody, Czech Republic, are inorganic two components aluminosilicate binder based on metakaolin and potassium alkaline solution. Aluminum powder with a particle size of 45 μm and was used for foaming. Silicious sand with a particle size of 500 μm and waste basalt fiber.

Cement
binder

Silicious
sand



Al powder

Potassium
alkaline silicate
solution

Waste basalt
fiber

Raw materials for production geopolymer composite layer on panels

MATERIALS AND EXPERIMENT DETAILS



| Samples | sand/binder | binder/liquid | basalt fiber/cement [%] | % wt. Al | Geo. layer thickness [mm] |
|---------|-------------|---------------|-------------------------|----------|---------------------------|
| No. 1 | - | - | - | - | - |
| No. 2 | 1 | 0.9 | 30 | 0.25 | 8-10 |
| No. 3 | 1 | 0.9 | 30 | 0.25 | 18-20 |
| No. 4 | - | 0.9 | 60 | 2.5 | 8-10 |
| No. 5 | - | 0.9 | 60 | 2.5 | 18-20 |

EXPERIMENT

Figs shows the sample arrangement for fire exposure. The specimen was inserted into door of the furnace and the flame intensity was applied by controlling the flow of gas.

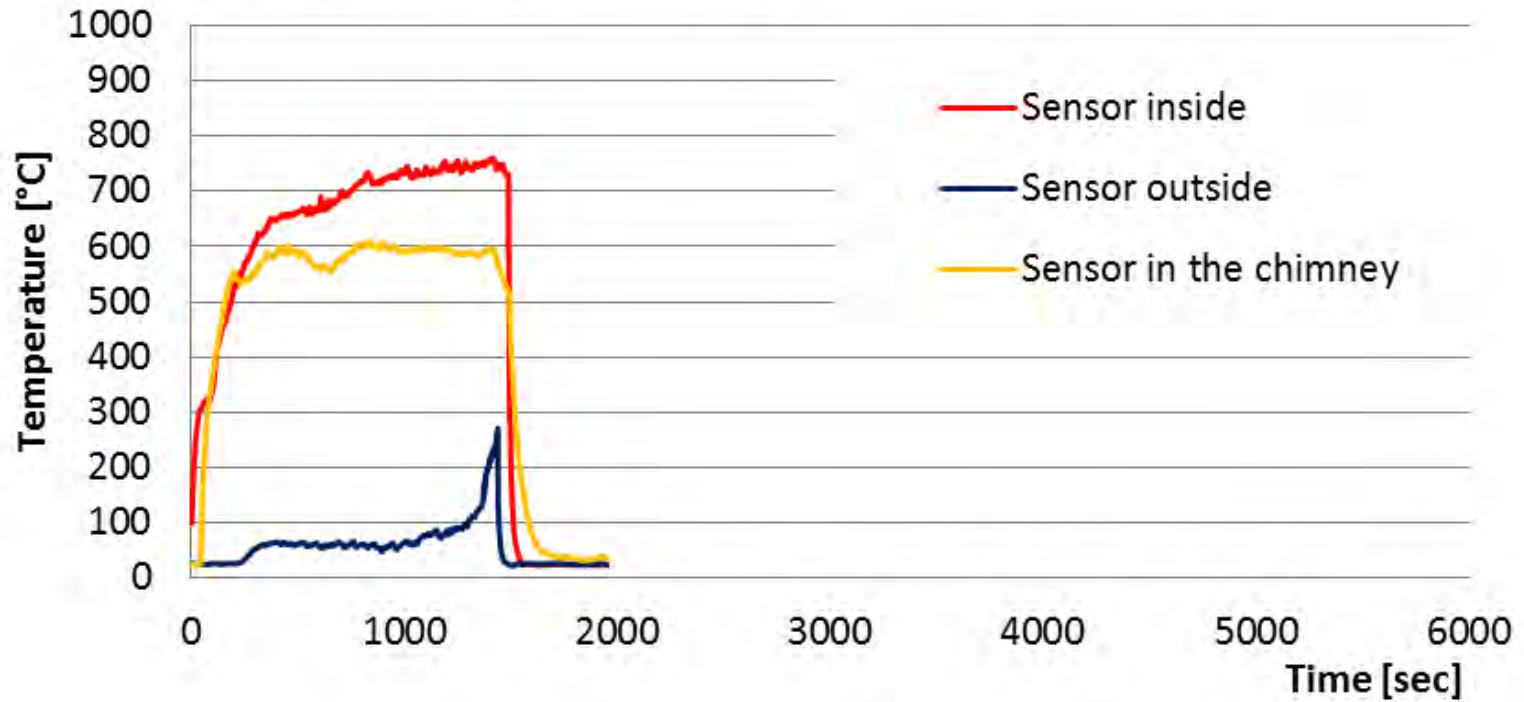


EXPERIMENT



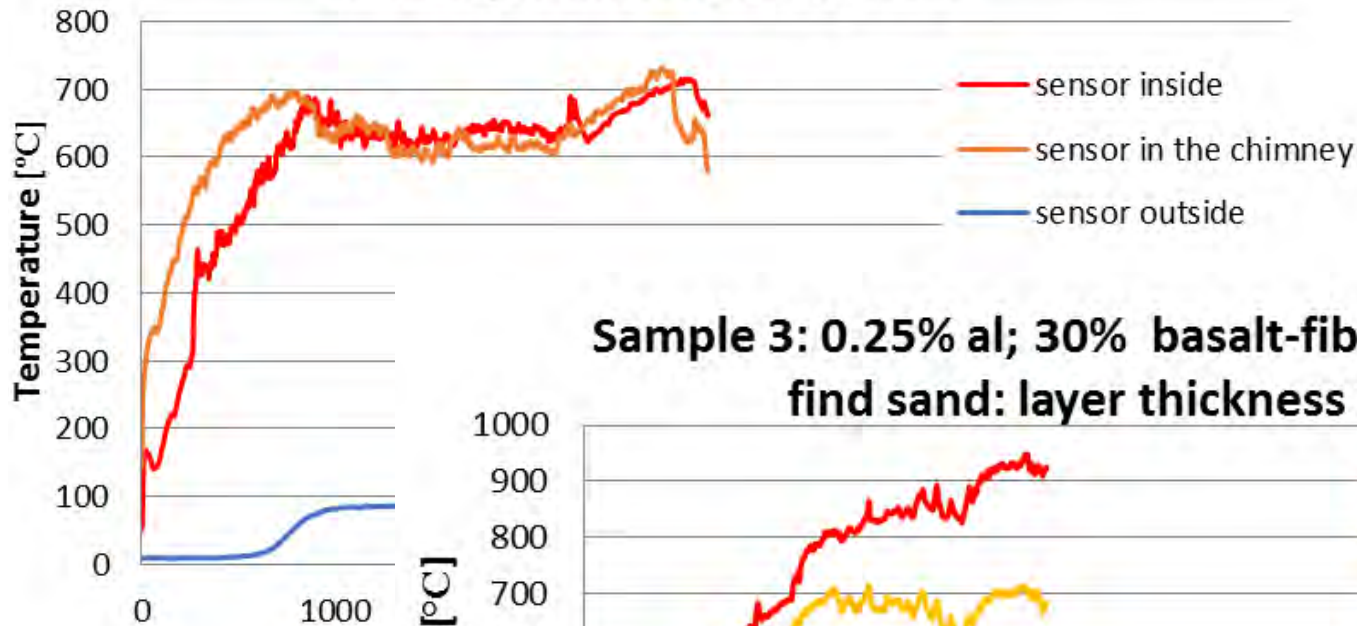
RESULTS

Sample 1: without geopolymer layer

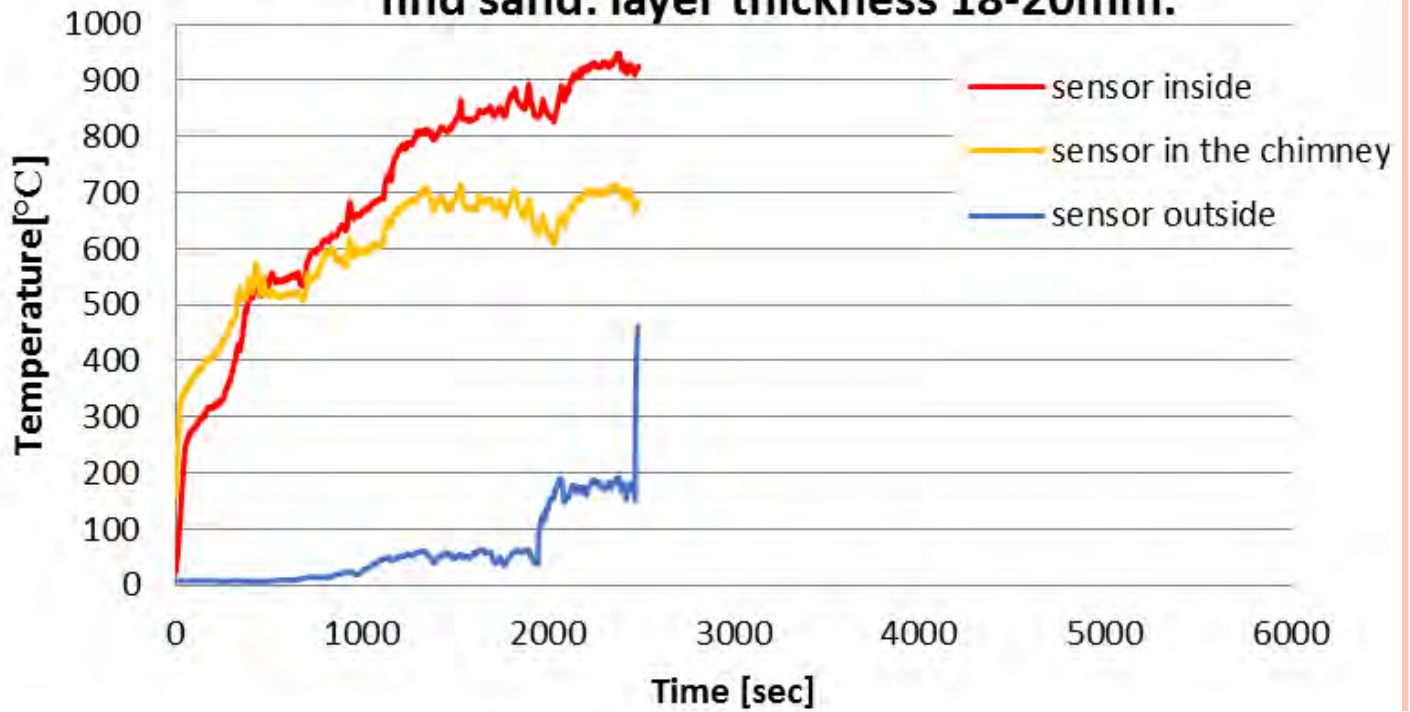


RESULTS

Sample 2: 0.25% al; 30% basalt-fiber waster; 100% of find sand; layer thickness 8-10 mm.

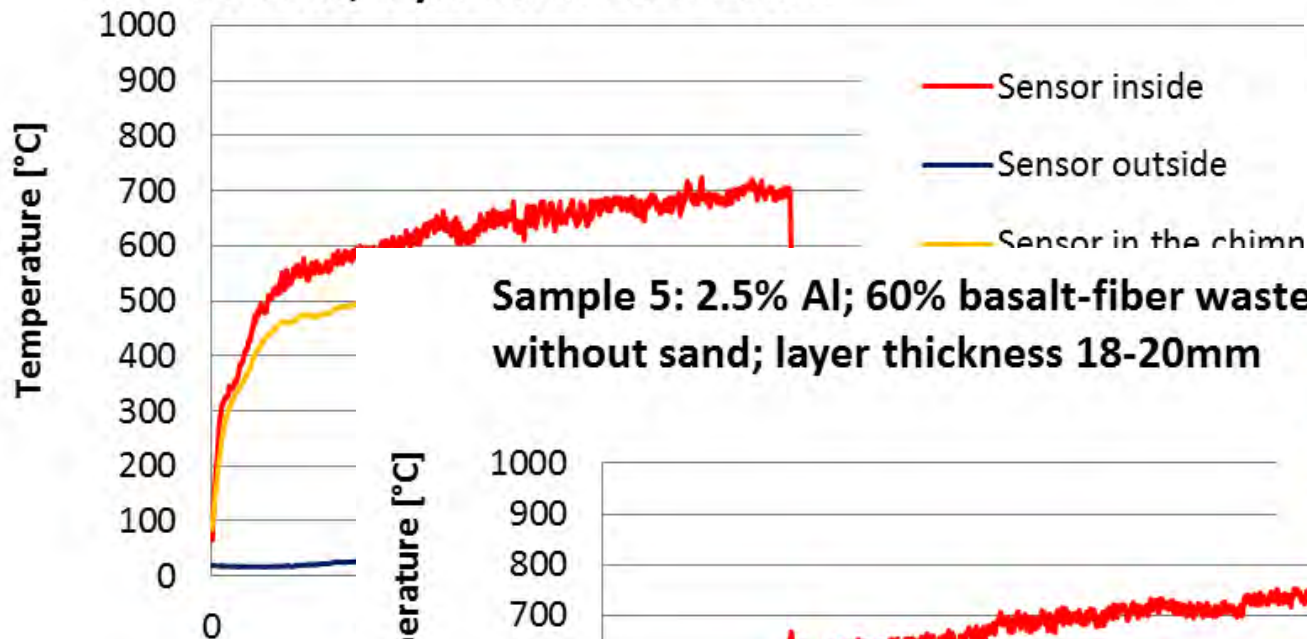


Sample 3: 0.25% al; 30% basalt-fiber waster ; 100% of find sand: layer thickness 18-20mm.

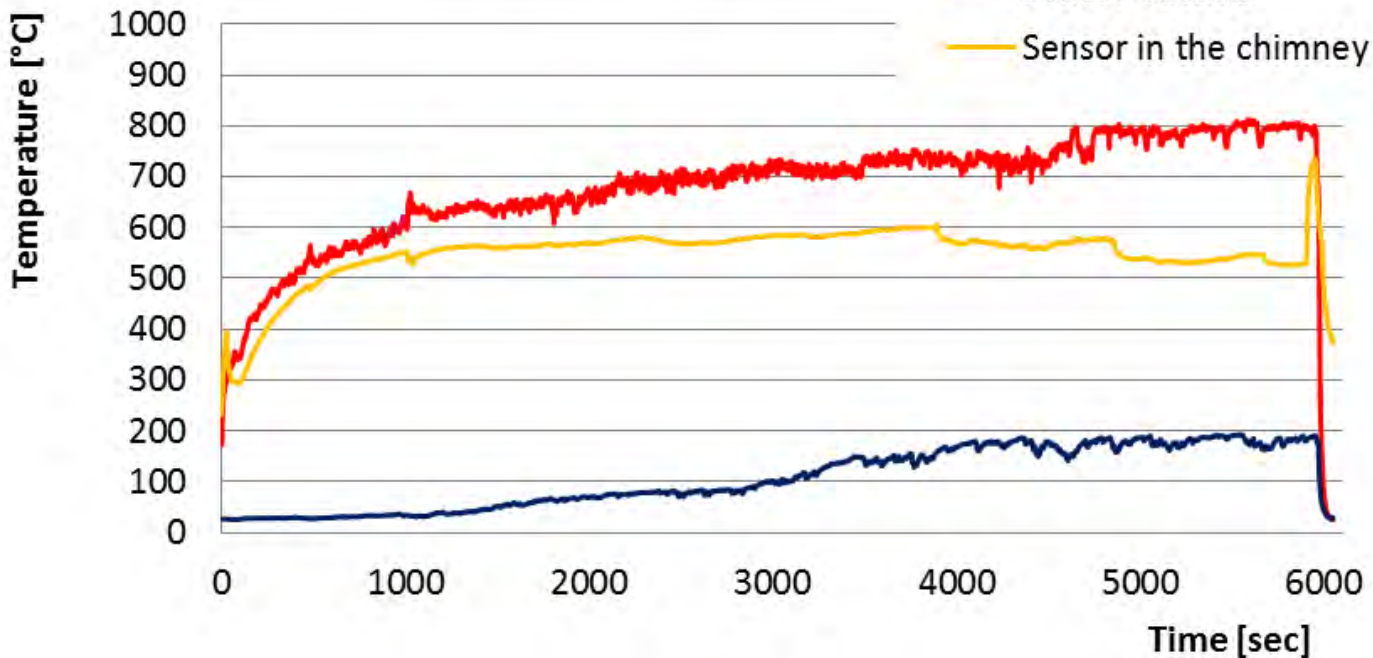


RESULTS

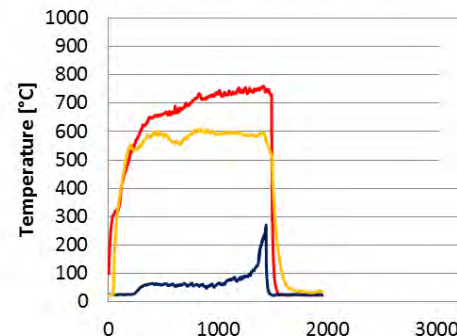
**Sample 4: 2.5% Al, 60% basalt-fiber waste;
without sand; layer thickness 8-10mm**



**Sample 5: 2.5% Al; 60% basalt-fiber waste;
without sand; layer thickness 18-20mm**



Sample 1: without geopolymer layer



OSB panel without a geopolymer layer (sample 1)

RESULTS



OSB panel with a geopolymer layer (sample 3)



CONCLUSIONS

- The experiment describe the fire testing of the OSB panels with a geopolymer layer and without them. They were proceeded testing after 21 days. The result showed that
 - OSB panel without a geopolymer layer could withstand around 20 minutes.
 - OSB panel with a geopolymer layer could keep in the time period: Sample 2 (50 minutes); Sample 3 (40 minutes); Sample 4 (50 minutes) and Sample 5 (100 minutes).
- Results of experimental confirmed more about applying of geopolymer for thermal insulation purpose and it can be used as great building material for fire-resistance.
- 1 m² ~ 3€

THANK YOU FOR YOUR ATTENTION

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