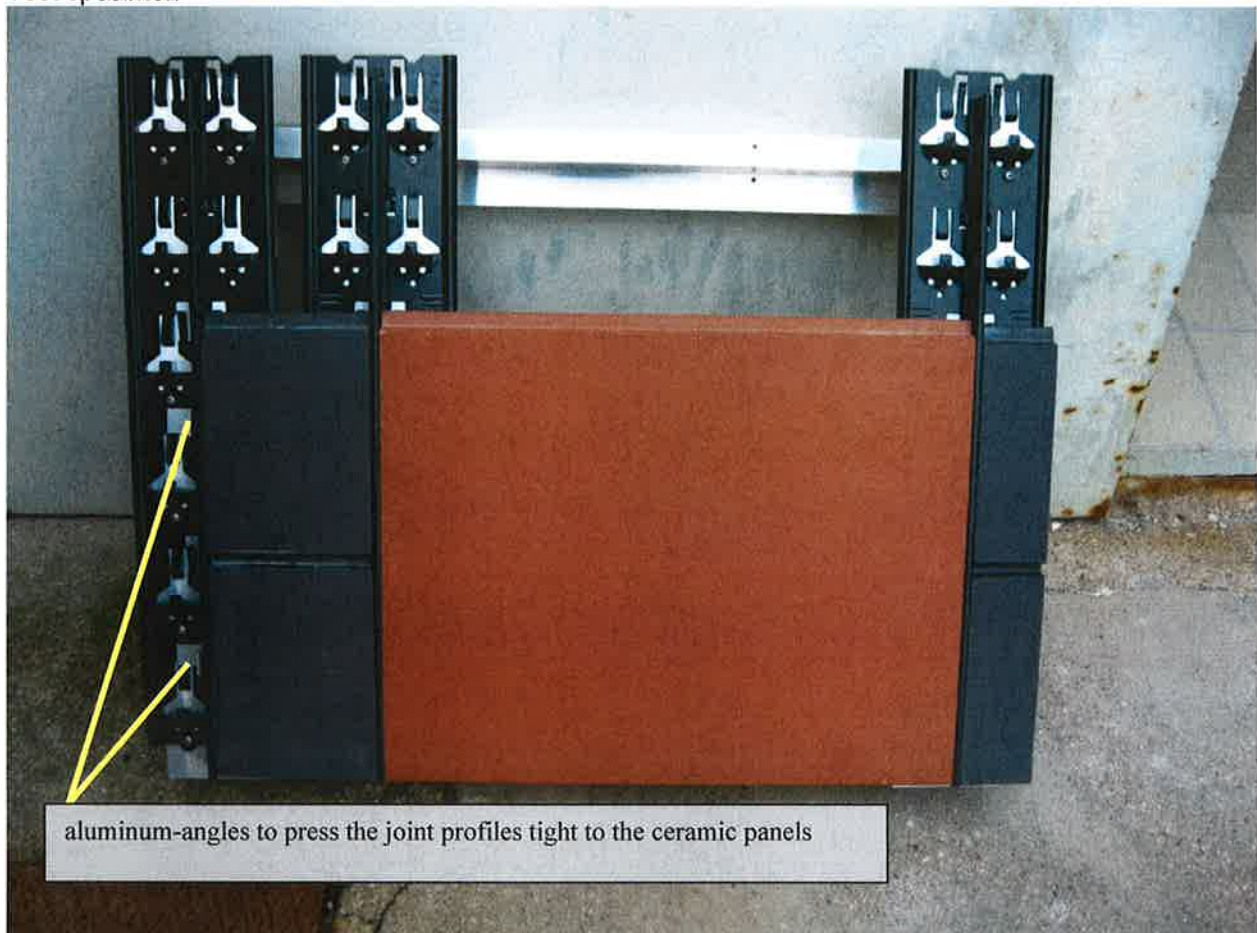


## Frost –Thaw – Test for KeraTwin® K20 system with joint profiles.

### Test circle:

- The test sample gets flooded, all holes in the panels are 100% filled by water .
- The temperature in the box +20°C
- The water stays for 2 hours
- The chamber gets emptied
- After 5 minutes freezing starts to -20°C
- Freezing time 2 hours
- Reiteration of the procedure

### Test specimen



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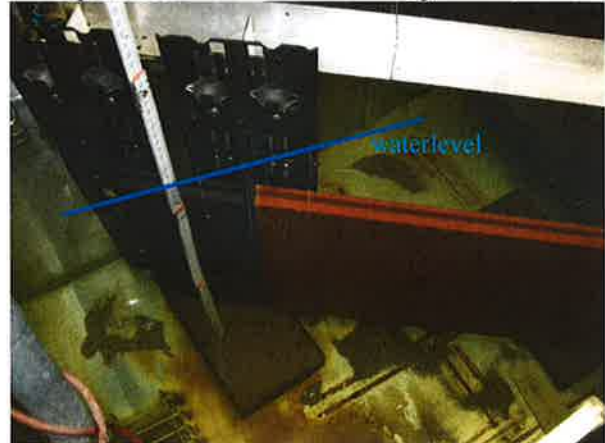
Test machine



Test specimen in the box without water.



Test specimen in the box flooded by water.



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Temperature -20.2°C



### **General Conclusion**

With the assembled test model, 200 frost-thaw alternating tests have been done without any damages so far. In case of rainstorm, the pipes will not be filled completely as it happened during the test in our lab. In addition the run-out time of the water is longer and already when raining the water will run out. Our test condition only allows a period of 5 minutes for the run out of the water while pumping out the tank.

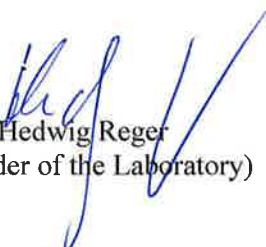
Even if the pipes are filled with water up to 85% when freezing starts, no damage will occur as the water will extend its volume by 9% when freezing. The water will turn into ice with a volume of 93% with a corresponding compression of the air.

As air molecules are smaller than water molecules, they will escape from the pipes when freezing as the joint profiles do not seal the pipes completely. The air will even penetrate through the ceramic panel. Based on the theoretical assumption that the increased air pressure will be kept during freezing, no damage will be possible.

The practical tests as well as the reflections in theory show that no damages can happen

Schwarzenfeld, 2011 September 27<sup>th</sup>

  
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