

Glues thermal qualification

Foreword: The purpose of this test was to perform a thermal test on a stove, on which Si heaters was assembled with Eccobond 45, NEE445 and CGL7018 in order to control their thermal performances.

Modifications:

Corrections:

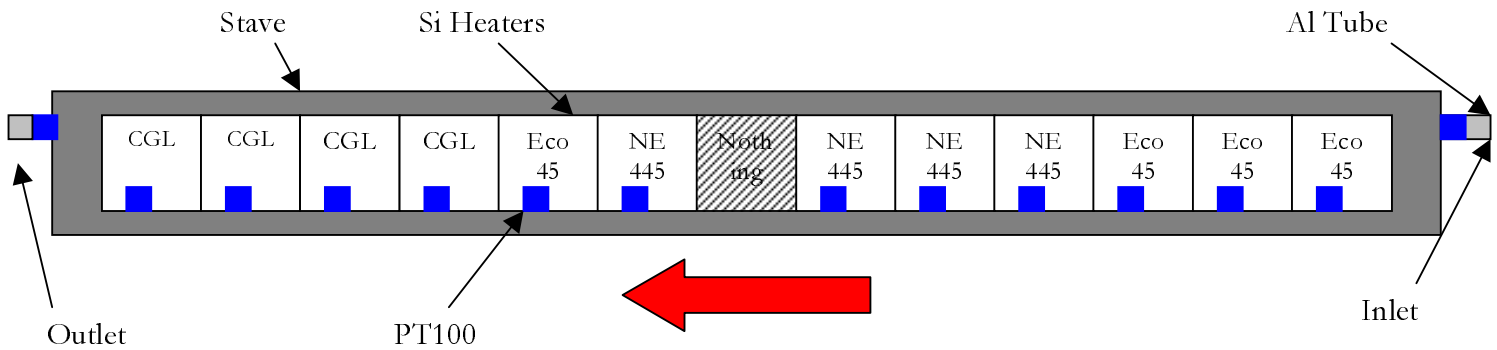
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1. Generalities

In order to complete the module attachment study, a thermal test was performed of a stave equipped with Si heaters, glued with the three different candidates (Eccobond 45, CGL7018 and NEE445).

The Glues deposition was made respecting the procedure which was study for each of them, in order to guarantee a confinement of it within the chips surface.

The assembly was made as follow:



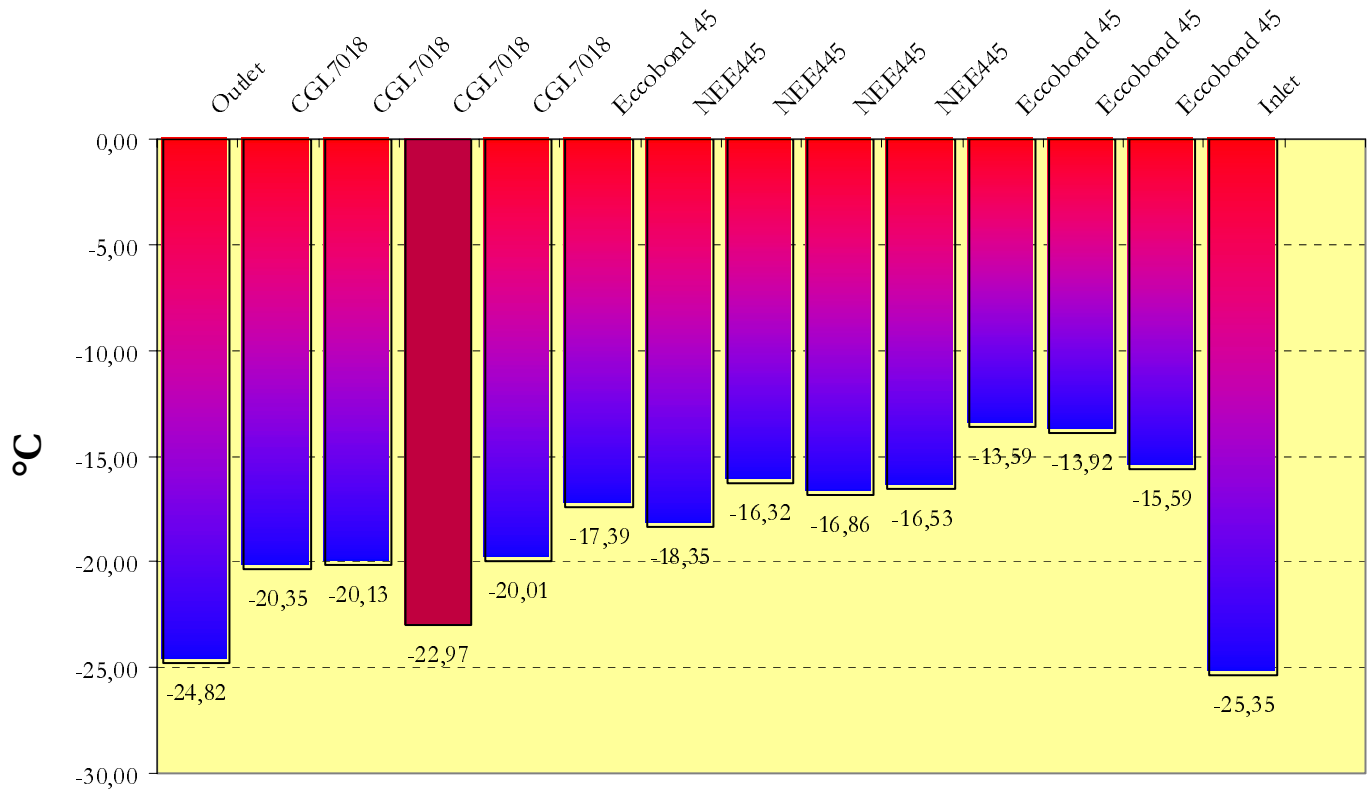
Each PT100 was glued on the Heater at the same place than for the previous thermal tests made at CPPM (in order to get comparable the results).

The test was performed with the C3F8 cooling system available at CPPM.

4.52 Watts was applied on each heater (≈ 58.76 Watts for the complete stave). The reason of this lower power than the specified 134 Watts is the limit of our cooling system (meanwhile the temperature is a linear function of the dissipated power, therefore the results are comparable).

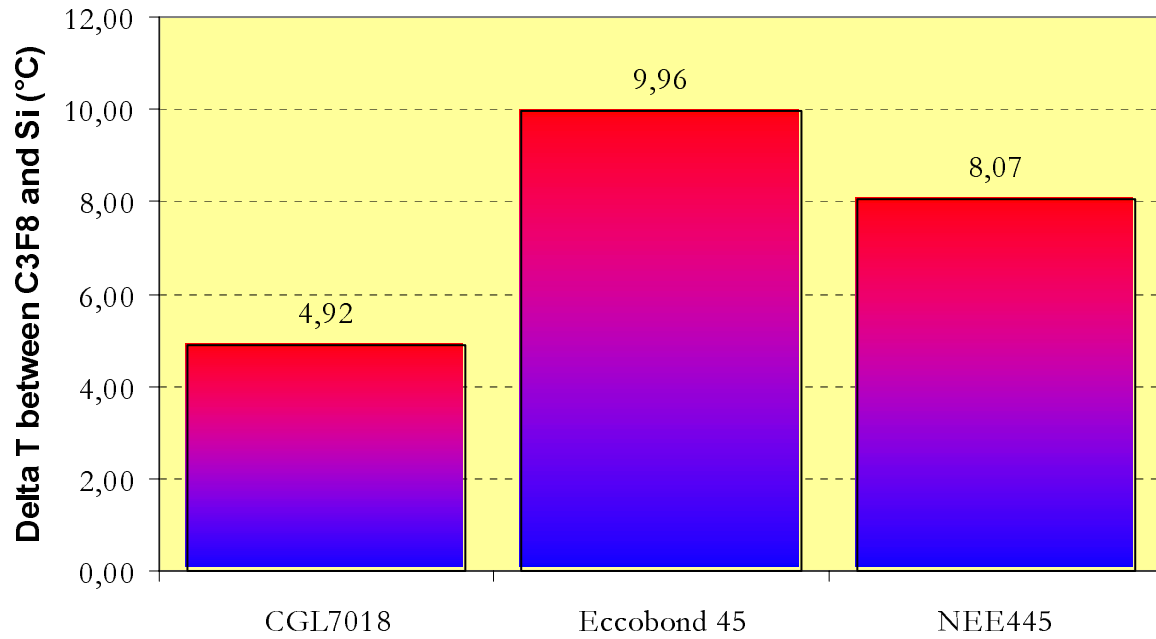
2. Results

The temperature distribution is shown below:

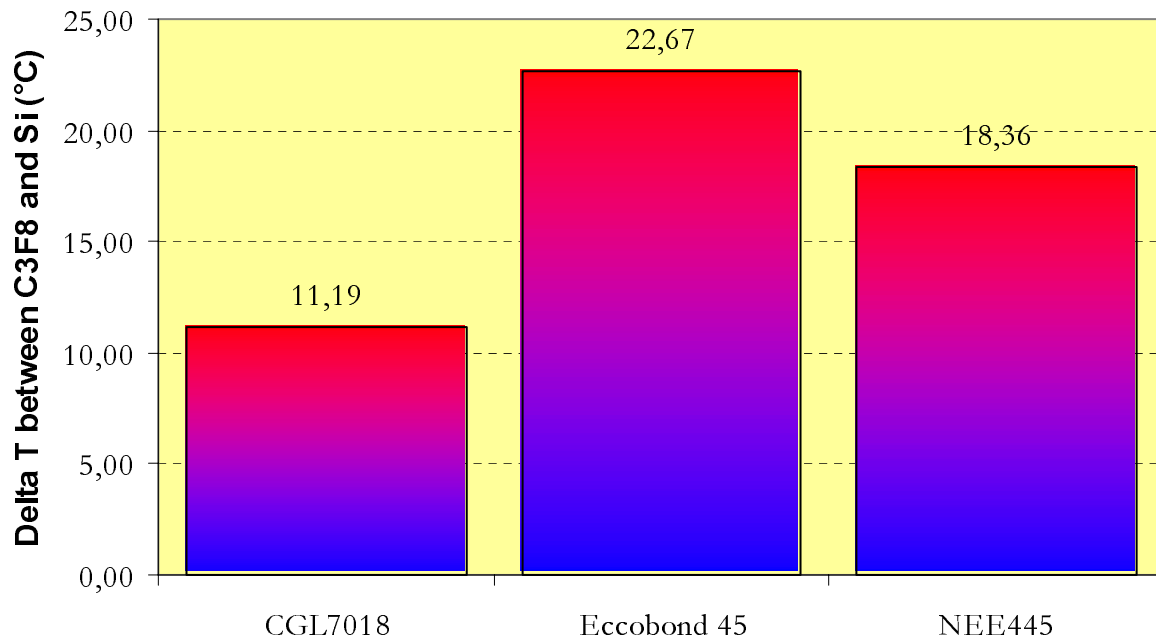


The Greyed column corresponds to on Si eater on which the power applied was lower than expected due to electrical shortcuts.

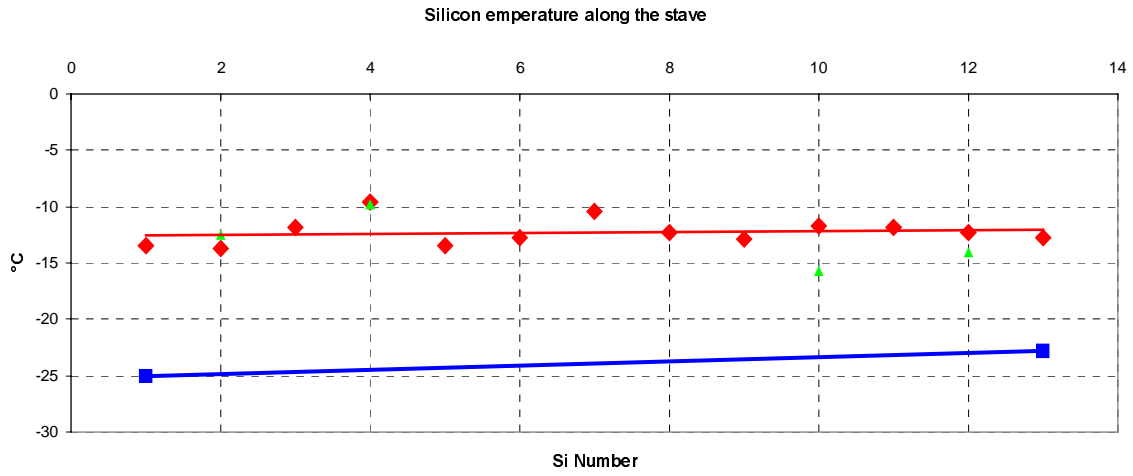
The average ΔT in between the Silicium and the cooling is shown bellow:



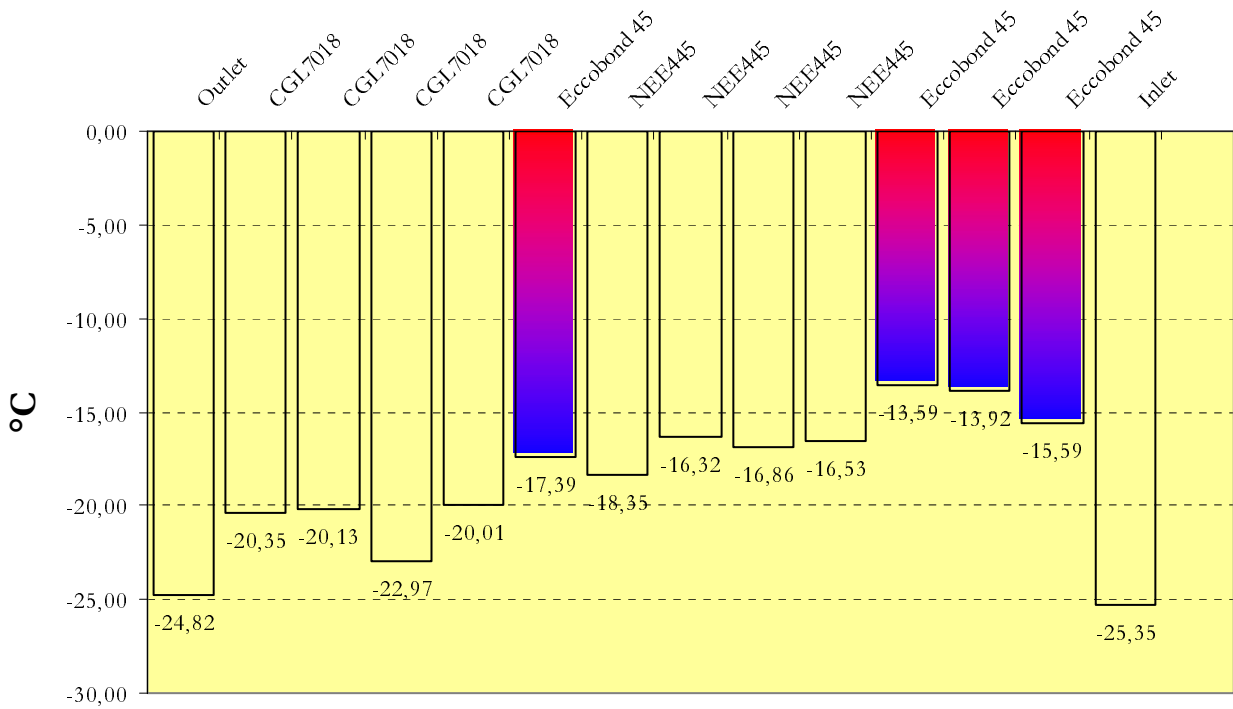
The extrapolation of those results to the ΔT we should find for a dissipated power of 134 Watts, is shown bellow.



This extrapolation is confirmed by the previous tests made at CERN with a stave prototype equipped with CGL7018 (results obtained in December 2000 and June 1999 on two different staves, see local structure FDR presentation).

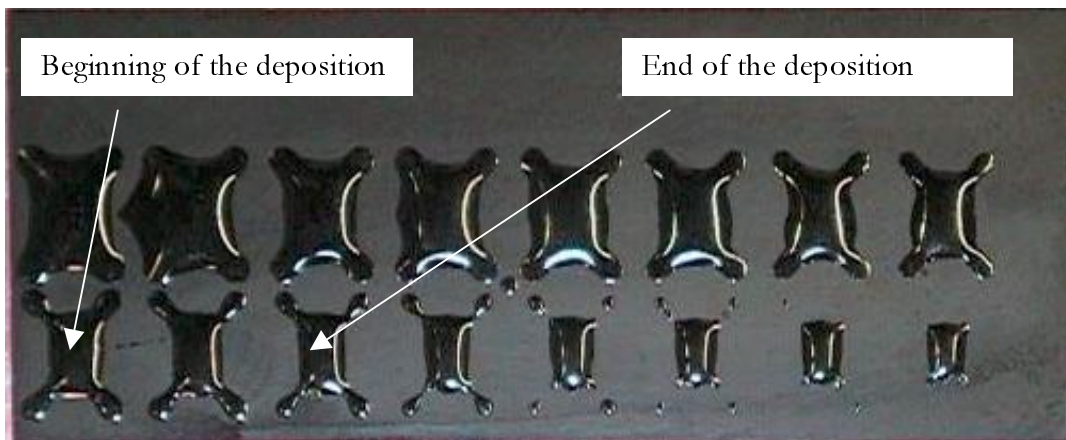


3. Potting life effect



Two dispensers were used to make the Eccobond assembly. The procedure describe in the previous document we have circulated concerning the applicability of the Eccobond, was used for this stave assembly. As it was defined two hours hold glue was used, the three column showed on the let of the plot correspond to three heaters which was deposit with the same dispenser. The time required for a deposition is about 10 minutes with this glue. Therefore we can see the degradation of the glue thermal properties due to its polymerization which affect the deposition.

The single column corresponds to a new glue used.



4. Conclusion

The CGL glues remain the best candidate for the thermal point of view. With regards to the results obtained, deciding to use even Eccobond or NEE445, would require a decision to determine if the temperature increase is acceptable.