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DOMUS

Design OptiMisation for efficient electric vehicles based on a USer-centric approach

DOMUS – Deliverable Report

D3.3 – Thermally insulating subsystem for the roof of the cabin

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[1] *Level of dissemination are:*

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Publishable summary

Within the scope of cabin comfort and energy efficiency improvements for Electrical Vehicle (EV) in DOMUS project, this document aims to highlight the work done on the development of:

- a 0/1D cabin model to assess the thermal impacts of innovative solutions in the car cabin
- vehicle cabin body physical parts that include innovative materials able to reduce thermal losses or to store energy as long as possible

Based on previous studies carried-out in Work Package (WP) 3 and disseminated in Deliverable (D) 3.1 (*Benchmark analysis results of the main contributors to the heating up of the cabin and/or thermal losses providing a detailed list of requirements and performance specifications*):

- a 0/1D model first correlated with physical tests at vehicle level will be exploited to virtually and comparatively prove the benefit of thermally insulating panels on:
  - surfaces & volumes temperatures (values and kinetics)
  - thermal losses through the car shell.
- body panel components will be developed, based on the latent heat accumulation of Phase Change Material (PCM), for capturing otherwise wasted thermal energy during the conditioning phases, and Vacuum Insulating Panels (VIP), for reducing thermal losses through the car body. This subcomponent will be implemented in relevant areas beforehand identified in T3.0.

The thermally relevant subcomponent will integrate two innovative materials families:

- first a family of material based on PCM that fulfill the appropriated specifications and requirements: high heat storage capacity, no leakages during phase change and processability.
- Secondly a family of superinsulating materials that exhibit low density (d<250kg.m-3), very low thermal conductivity (λ<7mW/m-1.K-1) and that are consequently more insulating than air and conventional insulating materials such as glasswool, rockwool, polyurethane foam… These products assure an efficient thermal insulation with limited extra-weights and extra-volumes.

This deliverable is the final report related to the development of thermally insulating body that will be physically integrated, tested and validated in the final demonstrator (WP6). It deals into details with the numerical and materials assessments performed by DOMUS partners on this topic.