

Comparative Analysis of a Self-Supporting Wall of Granite Slabs in a Multi- Leaves Enclosure System

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Abstract : Building enclosures and façades not only have an aesthetic component they must also ensure thermal comfort and improve the acoustics and air quality in buildings. The role of facades design, its assemblies, and construction are key in developing a greener future in architecture. This research and study focus on the design of a multi-leaves building envelope, with a self-supporting wall of granite slabs. The study will demonstrate the advantages of its use in compare with the hanging stone veneer in a vented cladding system. Using the Design of the School of Music and Theatre of the Atlantic Area in Spain as a case study where the multi-leaves enclosure system consists in a self-supported outer leaf of large granite slabs of 15cm. of thickness, a vent cavity with thermal isolation, a brick wall, and a series of internal layers. The methodology used were simulations and data collected in building. The advantages of the self-supporting wall of granite slabs in the outer leaf (15cm). compared with a hanging stone veneer in a vented cladding system can summarize the goals as follows: Using the stone in more natural way, by compression. The weight of the stone slabs goes directly to a strip-footing and don't overload the reinforced concrete structure of the building. The weight of the stone slabs provides an external aerial soundproofing, preventing the sound transmission to the structure. The thickness of the stone slabs is enough to provide the external waterproofing of the building envelope. The self-supporting system with minimum anchorages allows having a continuous and external thermal isolation without thermal bridges. The thickness of ashlar masonry provides a thermal inertia that balances the temperatures between day and night in the external thermal insulation layer. The absence of open joints gives the quality of a continuous envelope transmitting the sensations of the stone, the heaviness in the facade, the rhythm of the music and the sequence of the theatre. The main cost of stone due his bigger thickness is more than compensated with the reduction in assembly costs. Don't need any substructure systems for hanging stone veneers.

Keywords : self-supporting wall, stone cladding systems, hanging veneer cladding systems, sustainability of facade systems

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