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FASTENING OF CLADDING PANELS: CAN SLIDING CONNECTIONS REALLY SLIDE?

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The design schemes of precast concrete structures that consider the cladding panels as pure architectural components without stiffness and without any interactions with the frame structures are outdated, as shown by recent earthquakes like: *L'Aquila 2009*, *Grenada 2010* and *Emilia 2012*.

Several solutions to this issue are proposed and, among these, many suggest to tolerate mutual displacements that satisfy the deformation demands of the frame, uncoupling the kinematic behaviour of the panels using statically determinate connections. For this proposal to be truly effective, it is necessary to check experimentally side effects, like friction and tolerances that can jeopardize the predicted behaviour because are hardly foreseeable during the design.

Claddings are normally fixed to the structure by using a metal profile, bent to form a channel (channel-bar) where a hammerhead bolt can slide. In this case the sliding is used to permit the fixing despite large mounting tolerances and it is prevented once the bolt is tightened. These traditional connections can be modified, with several detail modifications, in innovative devices conceived to achieve a true-sliding connection both for vertical and horizontal panels.. Such connections shall be able to slide under in-plane forces while they are subjected to simultaneous out-of-plane forces arising from the panel inertia.

A dedicated test protocol is here proposed to assess these connections, designed to accommodate the panel sliding during the earthquake action. The experimental investigation aims at verifying the sliding capacity in the joints under combined quasi static actions, measuring the unwanted reaction forces produced by friction as a result of the loads produced by the panel inertia.

Together with the verification of the slide-capacity of the connection, the test quantifies the friction factor of the bolt-bar coupling from which the unintended forces opposite to the motion arise. In order to have a simpler test setup where parasitic actions are easily identifiable, only the coupling of the hammerhead bolt with the channel bar has been tested. A dedicated test machine has been designed for this purpose.

The paper presents the results collected in six test series on an innovative sliding connection, both for vertical and horizontal panels, which have been performed increasing the out-of-plane forces.

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