**Cairo University**

# Evaluation of Seismic Performance of Snug-tight Flush End Plate Connection.

***By***

**SHERIF HAMED MOHAMED HASSNIEN**

A Thesis Submitted to the Faculty of Engineering at Cairo University

In Partial Fulfillment of the Requirements for the Degree of

Doctor of philosophy

In

STRUCTURAL ENGINEERING

Faculty of Engineering, Cairo University

GIZA, EGYPT

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**Title of Thesis :** **Evaluation of Seismic Performance of Snug-tight Flush End Plate Connection**

**Key Words:** **(seismic performance – connection – steel – end plate – cyclic –flush)**

**Summary :**
Moment resisting frames are commonly used in earthquake resisting systems because of their ductile behavior and higher response modification factor than braced systems. This research investigates the performance of snug-tight flush end plate connections and whether such connections are prequalified to be considered for use in a ductile moment resisting frame. Moreover, the use of staggered web holes in the beam is proposed to improve connection seismic performance. Six samples were tested experimentally in order to complement the numerical analysis. A cyclic loading pattern defined by international standards was used in the testing process. Finite element analysis is performed using ANSYS software to model the connection configuration. Nonlinear material model is used in the analysis, and nonlinearity resulting from geometrical deformations during loading is also included. Finite element models are verified using experimental work results as well as other researchers' experimental work. It has been concluded that in some cases snug-tight flush end-plate connections may satisfy the strict requirements for prequalification. Also the proposed staggered web holes configuration showed promising results at some cases in improving the seismic performance of the connection.

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