

**BOLTED END PLATE BEAM TO COLUMN CONNECTIONS  
– ARE THEY SEMI RIGID?**

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Thesis submitted in partial fulfillment of the requirements for the degree of Master of  
Engineering

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## **Abstract**

The most commonly used moment resisting connections are bolted end plate beam to column connections. Connections are usually designed as simple or continuous although the actual behavior is known to fall between these two extreme cases. The use of semi- continuous connection results substantial savings in steel weight of the overall construction. Extended endplate, Flush end plate and partial depth connections are the widely used type of connections in steel frame construction. To understand the real behavior of semi- continuous connection, full scale laboratory test is the most accurate approach, but it is time consuming and costly to undertake. Therefore other methods were developed to predict the capacity of connections.

Thus, in this study 48 extended end plate and 48 flush end plate connections are analyzed to find the connection's behavior with variations in bolt diameter, end plate thickness, and grade (4.6/8.8) and bolt gauge length. A method proposed by Steel Construction Institute (SCI) is taken into account for analyzing. The analyzed connections are classified based on strength and stiffness.

Specially dedicated to my beloved family and friends...

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## LIST OF ABBREVIATIONS

Abbreviation	Description
$A_e$	Sum of the effective net areas of all the elements of the cross section
$A_{eff}$	Effective cross-sectional area
$A_g$	Gross cross-sectional area
$A_n$	Total net area
$A_s$	Shear area of a bolt
$A_t$	Tensile stress area as specified in the appropriate bolt standard
$A_v$	Shear area of member
$a_p$	Weld throat thickness
$b_1$	Stiff bearing length
$b_e$	Distance to the nearer end of the member from the end of the stiff bearing
$d$	Nominal diameter of the bolt
$e$	End distance
$F_{vp}$	Column web panel zone the local shear force
$P_{bb}$	Bearing capacity of the bolt
$p_{bs}$	Bearing strength of the connected part
$p_c$	Compressive strength
$p_s$	Shear strength of a bolt
$P_T$	Transverse capacity per unit length of weld

$P_t$	Tension strength of the bolt
$P_{bw}$	Bearing capacity of the web
$P_y$	Yield strength of the connected part.
$P_v$	Shear capacity
$p_{yw}$	Design strength of the web
$r$	Root radius
$s$	Leg length of a fillet weld
$T$	Thickness of a flange
$T$	Thickness of a web
$t_p$	Thickness of the connected part

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Appendix	Description
Appendix A	Design Calculations for Extended End Plate Connections
Appendix B	Design Calculations for Flush End Plate Connections