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DESIGN GUIDE

1

Design Guide for Cold-Formed Beams with Web Penetrations

August 1997



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Design Guide for Cold-Formed Steel Beams with Web Penetrations

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INTRODUCTION

This publication was developed by Roger A. LaBoube, University of Missouri-Rolla for the American Iron and Steel Institute with guidance from the AISI Residential Advisory Group. It is intended to provide design guidelines for the determination of the strength of a cold-formed steel flexural member with a web penetration. AISI believes that the information contained in this publication substantially represents industry practice and related scientific and technical information, but the information is not intended to represent an official position of AISI or to restrict or exclude any other construction or design technique.

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NOMENCLATURE

The following symbols are used in this design guide. For additional clarification of symbols, see Figure 1.

F_y	= specified minimum yield stress
M	= applied bending moment
M_a	= allowable bending moment
M_n	= nominal bending moment
N	= length of bearing
P	= applied concentrated load or reaction
P_a	= allowable concentrated load or reaction for web crippling alone
R_c	= reduction factor for web crippling
S_e	= effective section modulus
V	= applied shear force
V_a	= the allowable shear strength computed per Specification Section C3.2
V_{a1}	= allowable shear strength adjusted for penetration
V_1	= largest applied shear force at the edge of a penetration
V_2	= smallest applied shear force at the edge of a penetration
a	= depth of web penetration
b	= length of web penetration
c	= web measurement above the web penetration
h	= depth of flat portion of web
q_s	= reduction factor for web penetration
t	= steel base material thickness (uncoated)
x	= nearest distance between the penetration edge and edge of bearing