IN-LB	Inch-Pound Units
SI	International System of Units

Design of Slab-Column Connections in Monolithic Concrete Structures—Guide

Reported by ACI Committee 352

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This guide provides recommendations for determining proportions and details of monolithic nonprestressed and post-tensioned concrete slab-column connections.

Included are recommendations regarding appropriate uses of slab-column connections in structures resisting gravity and lateral forces, as well as earthquake-induced displacements; procedures for determination of connection load-carrying capacity; and reinforcement details to achieve adequate strength, deformation capacity, and structural integrity. Recommendations are based on a review of the literature for ultimate and serviceability limit states. A commentary is provided to clarify the recommendations and identify reference material. Design recommendations are set in standard type. Commentary is set in italics.

Keywords: connection; flat plate; flat slab; joint; lateral drift; post-tensioned; punching shear; seismic; shear reinforcement; slab-column.

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CHAPTER 1—INTRODUCTION AND SCOPE

1.1—Introduction

The recommendations in this guide are for determining connection proportions and details to provide adequate performance of cast-in-place nonprestressed and post-tensioned concrete slab-column connections. The recommendations are written to satisfy serviceability, strength, and ductility requirements related to the intended functions of the connection.

Design of the connection between a slab and its supporting member requires consideration of both the joint and the portion of the slab, or slab and beams, immediately adjacent to the joint. Several connection failures associated with inadequate performance of the slab adjacent to the joint have been reported (Engineering News Record 1956, 1971, 1973a,b,c,d; Joint ACI-ASCE Committee 426 1974; Leyendecker and Fattal 1977; Lew et al. 1982a,b; Rosenblueth and Meli 1986; Freyermuth 1989; Moehle 1996; Hueste and Wight 1997). However, no reported cases of connection failure due to distress within the joint have been identified. Some connection failures have occurred during construction when young concrete slabs received loads from more than one floor as a consequence of shoring and reshoring (Agarwal and Gardner 1974; Lew et al. 1982a,b; Sbarounis 1984; ACI PRC-347.2). The disastrous consequences of some failures, including total collapse of the structure, emphasize the importance of the design of the connection. These recommendations are intended to alert the designer to those aspects of behavior that should be considered in the design of the connection and to suggest design procedures that will lead to adequate connection performance under various loading conditions.

Connection performance, particularly during an earthquake, is affected by joint behavior, including slip of reinforcement embedded in the joint, and by the region of the slab or slab and transverse beams surrounding the joint. In general, the region of slab that directly affects connection behavior extends from the joint face the greater of twice the development length of the largest slab bars or four times the slab thickness (Joint ACI-ASCE Committee 426 1977).

1.2—Scope

This guide is an update of ACI PRC-352.1-11, which was originally published as ACI PRC-352.1-89. The updates are based on recent research and ACI CODE-318-19 requirements. Detailed examples have been included to illustrate the application of the recommendations in this guide. These recommendations apply only to slab-column connections in monolithic concrete structures, with or without drop panels, shear caps, or column capitals; and constructed with normalweight or lightweight concrete. Recommendations are provided for slab-column connections with or without shear reinforcement.

These recommendations are limited to cast-in-place nonprestressed and post-tensioned concrete slab-column connections, including two-way ribbed floor slab construction (Meli and Rodriguez 1979) and slab-column connections with transverse beams. Recommendations are made elsewhere (ACI PRC-352) for connection behavior consisting of action between beams and columns. For construction that combines slab-column and beam-column framing in orthogonal directions at individual connections, these recommendations are limited to issues related to the transfer of loads in the direction perpendicular to the beam axis.

Slab-column framing systems are generally considered inadequate as seismic-force-resisting systems assigned to high seismic design categories (D, E, F) because they are inherently flexible and may have limited drift capacity due to the potential for punching shear failures. However, if designed and detailed according to these recommenda-

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