

CONCRETE CHATS

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Load Transfer Devices – Round Dowels

Any discussion of mechanical devices for load transfer between concrete slabs will inevitably include smooth round dowels. Most, or all, designers are familiar with smooth round dowels and they are widely specified and shown on construction details. Experience with round dowels started with paving applications and that experience has been translated to floors, with information from Structural Design Considerations for Pavement Joints (ACI Committee 325 1956) referenced in ACI 360R-10 Guide to Design of Slabs on Ground Table 6.1.

History: The oldest concrete pavement in the US was constructed in 1893 in Bellafontaine, OH. More widespread use of concrete pavement in the US began in the early 1900s, generally between 1910 and 1920. The use of round for load transfer in concrete pavements dates back to about the same time frame of 1910 –1920. Over the next 40 – 50 years research, experiments and trials were conducted looking at and various diameters, lengths, and spacing of round dowels resulting currently accepted practices.

Configurations: A standard rule of thumb (and, yes, there are exceptions) is typically dowels 18" long spaced at 12" on center with diameters of 1/8 the pavement depth. Historical approaches included things like dowel lengths up to 48" with spacing up to 48" on center, dowels across the lane width or dowels in wheel paths only, and other variations, some of which still show up in plans from time to time.

Positive Results: The currently accepted practice has generally worked more than it hasn't. Closer spacing offers contributions from multiple dowels in carrying wheel load across joints while managing differential deflection reasonably well for many applications. As slab construction has evolved, smooth round dowel products and installation techniques have also evolved, but are there limits?

Challenges: By its shape, a round dowel has a limited surface area to carry load. Misalignment of dowels can occur during installation, potentially exacerbated by dowel length. Independent slab movement during setting can be limited by round dowels. Round dowels can loosen over time under frequent, heavy loading at higher speeds.

Smooth round dowels are used in construction joints as well as sawed control joints. Elliptical and square dowels, which increase load carrying surface area, are also available but don't seem to be specified as widely as smooth round dowels.

QuicTip▶ [QuicDowel System - BoMetals Inc.](#) and [Round Dowel Baskets - BoMetals Inc.](#) are available for use with [Smooth Round Dowels - BoMetals Inc.](#) which with and without epoxy coating.

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