OMB No. 4617840912659

Punching Shear Strength Of Interior Concrete Slab Column

Punching Shear Design | Transfers slabs and two way flat plate slabs CSI SAFE 2016 Punching Shear Tutorial - Example and Practical Theory Bolted Connection - Bolt Shear Punching shear stress - By Prof.L.Agarwal. Interior Column : How To Calculate Punching Shear In ETABS? PUNCHING SHEAR REINFORCEMENT Punching Shear | Two way Shear | Punching Shear in footing | Two way Shear in footing Manchester Slab Strengthening for Punching Shear Construction Product For HIGH Shear Value In Hurricane or Seismic Zones! Building a Classic Bookbinding Vise 80/20: Threaded Stem Caster Overview How-To: Reading Construction Blueprints [Structural #1 - Beams, Straps, Shear Walls] Shear Forces \u0026 Back Pain Squaring Shear Safety Deema Abu-Salma | Punching Shear at Slab-Edge Column Connections Ball end punch Lecture 17 - Hand Design of Shear Studs (Studrails) for Punching Shear How to Install the Strong-Wall® High-Strength Wood Shearwall (Animation) Two Way (Punching) Shear - Concept Explained and Flat Plate Example - CSA A23.3 (Canadian Code) Punching Shear LInk Detail Pad Foundation Design | Punching shear check Part 2. PSB® and PSB PLUS® – Overcome Punching Shear in Flat Slabs Punching Shear calculations app based on Critical Shear Crack Theory Punching Shear in Foundation \u0026 Slab with 3D Animation Calculate Punching Shear Review of Key Parameters Affecting Punching Shear Strength of Post-Tensioned Slabs Punching Shear Punching Shear what is punching shear Punching Shear Link Design

Technical Report
Influence of Size on Punching Shear Strength of Concrete Slabs
Concrete Solutions 2011
Innovation in Concrete Structures
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Hybrid Composite Precast Systems
Proceedings of the 2017 fib Symposium, held in Maastricht, The Netherlands, June 12-14, 2017
Reinforced Polymer Composites
Computational Plasticity
Proceedings of the 4th International Conference on Civil Engineering and Urban Planning, Beijing, China, 25-27 July 2015

Punching Shear Strength Of Interior Concrete Slab Column ***OMB No. 4617840912659 edited by***

RICHARD RILEY

Technical Report PHI Learning Pvt. Ltd. Civil Engineering and Urban Planning IV includes the papers presented at the 4th International Conference on Civil Engineering and Urban Planning (CEUP 2015, Beijing, China, 25-27 July 2015). The contributions from experts and world-renowned scientists cover a wide variety of topics: - Civil engineering;- Architecture and urban planning; - Transpor

Influence of Size on Punching Shear Strength of Concrete Slabs RILEM Publications

“Computational Plasticity with Emphasis on the Application of the Unified Strength Theory” explores a new and important branch of computational mechanics and is the third book in a plasticity series published by Springer. The other two are: Generalized Plasticity, Springer: Berlin, 2006; and Structural Plasticity, Springer and Zhejiang University Press: Hangzhou, 2009. This monograph describes the unified strength theory and associated flow rule, the implementation of these basic theories in computational programs, and shows how a series of results can be obtained by using them. The unified strength theory has been implemented in several special nonlinear finite-element programs and commercial Finite Element Codes by individual users and corporations. Many new and interesting findings for beams, plates, underground caves, excavations, strip foundations, circular foundations, slop, underground structures of hydraulic power stations, pumped-storage power stations, underground mining, high-velocity penetration of concrete structures, ancient structures, and rocket components, along with relevant computational results, are presented. This book is intended for graduate students, researchers and engineers working in solid mechanics, engineering and materials science. The theories and methods provided in this book can also be used for other computer codes and different structures. More results can be obtained, which put the potential strength of the material to better use, thus offering material-saving and energy-saving solutions. Mao-Hong Yu is a professor at the Department of Civil Engineering at Xi'an Jiaotong University, Xi'an, China.

Concrete Solutions 2011 FIB - Féd. Int. du Béton

Hybrid Composite Precast Systems: Numerical Investigation to Construction focuses on the design and construction of novel composite precast frame systems that permit almost effortless erection and structural efficiency. The precast frame systems discussed in the book are similar to that of steel frames, but offer similar savings to concrete frames. The design of connections and detailed analysis of their structural behavior is discussed in detail. Fundamentals with regards to the post yield behavior of concrete and metal are also presented to illustrate how these two different materials are integrated together to remove individual material drawbacks. Readers are given a broad introduction to existing technologies that are then combined with a description of the

construction methods the author proposes. This book will help the end users become familiar with the existing types of structural forms, not just the "Lego" type frame system that the author proposes. Discusses how traditional construction methods can be replaced by innovative hybrid composite precast frame systems that provide rapid and effortless erection capabilities and structural efficiency Contains several design examples using non-linear finite element analysis completed with Abaqus based-software Contains new milestone inventions in construction that offer structural engineering solutions using a novel, modularized hybrid frame system Provides information on structural testing that verifies the accuracy of the structural design

Innovation in Concrete Structures

Punching Shear Strength of Interior and Edge Column-slab Connections in CFRP Reinforced Flat Plate Structures Transferring Shear and MomentA New Punching Shear Strengthening Technique for Reinforced Concrete Slabs at Interior Slab-column ConnectionsExperimental Study of Punching Shear Resistance of Synthetic Fiber Reinforced Concrete Interior Slabs"This study experimentally explores the suitability of Synthetic Fiber-Reinforced Concrete (SNFRC) as a feasible method for improving the punching shear strength of two-way slabs. The investigation involved interior flat slab panels made with two synthetic fiber volumetric percentages, as well as three spacing configurations for the flexural reinforcement. Nine full-scale, 2m*2m*0.15m slabs, are utilized to quantify the SNFRC impact on punching shear strength, toughness and deformation capacity. The nine slabs are divided into three groups of fiber volumetric content: 1.25%, 0.75% and 0%. Each group consists of three flexural steel reinforcement spacing configurations: 16mm-diameter rebars at 60mm, 80mm and 110mm. For SNFRC material characterization, compressive strength and tensile rupture strength are captured via standard 150*150*150mm cubes and 150*150*500mm rectangular prisms, respectively. Material characterization revealed that the introduction of synthetic fibers had a negligible impact on the compressive strength. A reduction of merely 3.4% and 2.3% is associated with adding 1.25% and 0.75% fiber content, respectively. Conversely, the three-point loading test results in 14% and 4% higher rupture tensile strengths associated with 1.25% and 0.75% fiber contents. Moreover, the introduction of synthetic fiber dosages of 1.25% and 0.75% resulted in considerable improvement to the punching shear strength, 36% and 15%, respectively. The greatest effect of the synthetic fiber is found to be on the slab deformation capacity and toughness (quantified as the area under the load-deflection curve). For the 0.75% fibers group, the improvement ranged from 67% to 274% associated with the 60mm the 110mm spacing, respectively. Similarly, for the 1.25% group, the corresponding counterparts have an improvement range of 82% to 324%. For comparison purposes, several analytical predictions for the punching shear strength are made in accordance to the CEB-FIB 2010 Model Code, ACI-318, ACI-544 codes as well as models available in the literature. One particular model is found to best agree with SNFRC slabs when it is re-calibrated in this study. The re-calibration utilized the differences in the steel and synthetic fibers mechanical properties. Namely, Young’s modulus, the tensile strength and fiber-concrete bond strength."--Abstract.Punching Shear in Reinforced Concrete SlabsPunching of Structural Concrete SlabsTechnical Report

The quality and testing of materials used in construction are covered by reference to the appropriate ASTM standard specifications. Welding of reinforcement is covered by reference to the appropriate AWS standard. Uses of the Code include adoption by reference in general building codes, and earlier editions have been widely used in this manner. The Code is written in a format that allows such reference without change to its language. Therefore, background details or suggestions for carrying out the requirements or intent of the Code portion cannot be included. The Commentary is provided for this purpose. Some of the considerations of the committee in developing the Code portion are discussed within the Commentary, with emphasis given to the explanation of new or revised provisions. Much of the research data referenced in preparing the Code is cited for the user desiring to study individual questions in greater detail. Other documents that provide suggestions for carrying out the requirements of the Code are also cited.

Full-scale Load Testing of Structures Taylor & Francis US

Advances in Concrete Slab Technology documents the proceedings of the International Conference on Concrete Slabs held at Dundee University on April 3-6, 1979. This book discusses the influence of steel fiber-reinforcement on the shear strength of slab-column connections; sulfur-treated concrete slabs; yield line analysis of orthotropicaly reinforced exterior panels of flat slab floors; and behavior of flat slab/edge column joints. The design of multiple panel flat slab structures; structural behavior of floor slabs in shear wall buildings; shrinkage and cracking of concrete at early ages; and slab construction for HAB system modules are also elaborated. This text likewise covers the direct finishing of concrete slabs using the early age power grinding technique; application of vacuum dewatering to in-situ slab production; retexturing of concrete slabs; and fatigue resistance of composite precast and in situ concrete floors. This publication is a good reference for students and individuals concerned with the practices and research relating to slab technology.

Experimental Study of Punching Shear Resistance of Synthetic Fiber Reinforced Concrete Interior Slabs

Simon and Schuster

Fibre-reinforced polymer (FRP) reinforcement has been used in construction as either internal or external reinforcement for concrete structures in the past decade. This book provides the latest research findings related to the development, design and application of FRP reinforcement in new construction and rehabilitation works. The topics include FRP properties and bond behaviour, externally bonded reinforcement for flexure, shear and confinement, FRP structural shapes, durability, member behaviour under sustained loads, fatigue loads and blast loads, prestressed FRP tendons, structural strengthening applications, case studies, and codes and standards.

Fibre-reinforced Polymer Reinforcement For Concrete Structures (In 2 Volumes) - Proceedings Of The Sixth International Symposium On Frp Reinforcement For Concrete Structures (Frprcs-6) CRC Press

The Concrete Solutions series of International Conferences on Concrete Repair began in 2003, with a conference held in St. Malo, France in association with INSA Rennes, followed by the second conference in 2006 (with INSA again, at St. Malo, France), and the third conference in 2009 (in Padova and Venice, in association with the University of Padova). Now in 2011, the event is being held in Dresden in Germany and has brought together some 112 papers from 33 countries. Whereas electrochemical repair tended to dominate the papers in earlier

years, new developments in structural strengthening with composites have been an increasingly important topic, with a quarter of the papers now focusing on this area. New techniques involving Near Surface Mounted (NSM) carbon fibre rods, strain hardening composites, and new techniques involving the well established carbon fibre and polyimide wrapping and strengthening systems are presented. Seventeen papers concentrate on case studies which are all-important in such conferences, to learn about what works (and what doesn't work) on real structures. Thirteen papers are devoted to new developments in Non-Destructive Testing (NDT). Other topics include service life modelling, fire damage, surface protection methods and coatings, patch repair, general repair techniques and whole life costing. This book is essential reading for anyone engaged in the concrete repair field, from engineers, to academics and students and also to clients, who, as the end user, are ultimately responsible for funding these projects and making those difficult decisions about which system or method to use.

Further Tests of the Punching Shear Strength of Lightly Reinforced Isotropic Bridge Decks fib Fédération internationale du béton

Punching Shear Strength of Interior and Edge Column-slab Connections in CFRP Reinforced Flat Plate Structures Transferring Shear and MomentA New Punching Shear Strengthening Technique for Reinforced Concrete Slabs at Interior Slab-column ConnectionsExperimental Study of Punching Shear Resistance of Synthetic Fiber Reinforced Concrete Interior Slabs

High Tech Concrete: Where Technology and Engineering Meet ASTM International

This book, consisting of 21 articles, including three review papers, written by research groups of experts in the field, considers recent research on reinforced polymer composites. Most of them relate to the fiber-reinforced polymer composites, which are a real hot topic in the field. Depending on the reinforcing fiber nature, such composites are divided into synthetic and natural fiber-reinforced ones. Synthetic fibers, such as carbon, glass, or basalt, provide more stiffness, while natural fibers, such as jute, flax, bamboo, kenaf, and others, are inexpensive and biodegradable, making them environmentally friendly. To acquire the benefits of design flexibility and recycling possibilities, natural reinforcers can be hybridized with small amounts of synthetic fibers to make them more desirable for technical applications. Elaborated composites have great potential as structural materials in automotive, marine and aerospace application, as fire resistant concrete, in bridge systems, as mechanical gear pair, as biomedical materials for dentistry and orthopedic application and tissue engineering, as well as functional materials such as proton-exchange membranes, biodegradable superabsorbent resins and polymer electrolytes.

(a Study by 3-D Non-linear Finite Element Analysis) FIB - Féd. Int. du Béton

Fibre-reinforced polymer (FRP) reinforcement has been used in construction as either internal or external reinforcement for concrete structures in the past decade. This book provides the latest research findings related to the development, design and application of FRP reinforcement in new construction and rehabilitation works. The topics include FRP properties and bond behaviour, externally bonded reinforcement for flexure, shear and confinement, FRP structural shapes, durability, member behaviour under sustained loads, fatigue loads and blast loads, prestressed FRP tendons, structural strengthening applications, case studies, and codes and standards.

Advances in Civil Engineering and Building Materials CRC Press

Presentation of the latest scientific and engineering developments in the field of tubular steel structures. Covers key and emerging subjects of hollow structural sections, such as: static and fatigue behaviour of connections/joints, concrete filled hollow sections and composite tubular members, offshore structures, earthquake resistance,

Hybrid Composite Precast Systems American Concrete Institute

fib Bulletin 81 reports the latest information available to researchers and practitioners on the analysis, design and experimental evidence of punching shear of structural concrete slabs. It follows previous efforts by the International Federation for Structural Concrete (fib) and its predecessor the Euro-International Committee for Concrete (CEB), through CEB Bulletin 168, Punching Shear in Reinforced Concrete (1985) and fibBulletin 12, Punching of structural concrete slabs (2001), and an international symposium sponsored by the punching shear subcommittee of ACI Committee 445 (Shear and Torsion) and held in Kansas City, Mo., USA, in 2005. This bulletin contains 18 papers that were presented in three sessions as part of an international symposium held in Philadelphia, Pa., USA, on October 25, 2016. The symposium was co-organized by the punching shear sub-committee of ACI 445 and by fib Working Party 2.2.3 (Punching and Shear in Slabs) with the objectives of not only disseminating information on this important design subject but also promoting harmonization among the various design theories and treatment of key aspects of punching shear design. The papers are organized in the same order they were presented in the symposium. The symposium honored Professor Emeritus Neil M. Hawkins (University of Illinois at Urbana-Champaign, USA), whose contributions through the years in the field of punching shear of structural concrete slabs have been paramount. The papers cover key aspects related to punching shear of structural concrete slabs under different loading conditions, the study of size effect on punching capacity of slabs, the effect of slab reinforcement ratio on the response and failure mode of slabs, without and with shear reinforcement, and its implications for the design and formulation in codes of practice, an examination of different analytical tools to predict the punching shear response of slabs, the study of the post-punching response of concrete slabs, the evaluation of design provisions in modern codes based on recent experimental evidence and new punching shear theories, and an overview of the combined efforts undertaken jointly by ACI 445 and fib WP 2.2.3 to generate test result databanks for the evaluation and calibration of punching shear design recommendations in North American and international codes of practice.

Proceedings of the 2017 fib Symposium, held in Maastricht, The Netherlands, June 12-14, 2017 World Scientific

"This study experimentally explores the suitability of Synthetic Fiber-Reinforced Concrete (SNFRC) as a feasible method for improving the punching shear strength of two-way slabs. The investigation involved interior flat slab panels made with two synthetic fiber volumetric percentages, as well as three spacing configurations for the flexural reinforcement. Nine full-scale, 2m*2m*0.15m slabs, are utilized to quantify the SNFRC impact on punching shear strength, toughness and deformation capacity. The nine slabs are divided into three groups of fiber volumetric content: 1.25%, 0.75% and 0%. Each group consists of three flexural steel reinforcement spacing configurations: 16mm-diameter rebars at 60mm, 80mm and 110mm. For SNFRC material

characterization, compressive strength and tensile rupture strength are captured via standard 150*150*150mm cubes and 150*150*500mm rectangular prisms, respectively. Material characterization revealed that the introduction of synthetic fibers had a negligible impact on the compressive strength. A reduction of merely 3.4% and 2.3% is associated with adding 1.25% and 0.75% fiber content, respectively. Conversely, the three-point loading test results in 14% and 4% higher rupture tensile strengths associated with 1.25% and 0.75% fiber contents. Moreover, the introduction of synthetic fiber dosages of 1.25% and 0.75% resulted in considerable improvement to the punching shear strength, 36% and 15%, respectively. The greatest effect of the synthetic fiber is found to be on the slab deformation capacity and toughness (quantified as the area under the load-deflection curve). For the 0.75% fibers group, the improvement ranged from 67% to 274% associated with the 60mm the 110mm spacing, respectively. Similarly, for the 1.25% group, the corresponding counterparts have an improvement range of 82% to 324%. For comparison purposes, several analytical predictions for the punching shear strength are made in accordance to the CEB-FIB 2010 Model Code, ACI-318, ACI-544 codes as well as models available in the literature. One particular model is found to best agree with SNFRC slabs when it is re-calibrated in this study. The re-calibration utilized the differences in the steel and synthetic fibers mechanical properties. Namely, Young’s modulus, the tensile strength and fiber-concrete bond strength."--Abstract.

Reinforced Polymer Composites Cambridge Scholars Publishing

The design of structures in general, and prestressed concrete structures in particular, requires considerably more information than is contained in building codes. A sound understanding of structural behaviour at all stages of loading is essential. This textbook presents a detailed description and explanation of the behaviour of prestressed concret

Computational Plasticity Tata McGraw-Hill Education

Providing both an introduction to basic concepts and an in-depth treatment of the most up-to-date methods for the design and analysis of concrete of structures, "Design of Prestressed Concrete" will service the needs of both students and professional engineers.

Proceedings of the 4th International Conference on Civil Engineering and Urban Planning, Beijing, China, 25-27 July 2015

American Concrete Institute

This book details the theory and applications of finite element (FE) modeling of post-tensioned (PT) concrete structures, and provides the updated MATLAB code (as of 2019). The challenge of modeling PT prestressed concrete structures lies in the treatment of the interface between the concrete and prestressing tendons. Using MATLAB, this study develops an innovative nonlinear FE formulation which incorporates contact techniques and engineering elements to considerably reduce the need of computational power. This FE formulation has the ability to simulate different PT frame systems with fully bonded, fully unbonded or partially bonded tendons, as well as actual sliding behavior and frictional effects in the tendons. It also allows for the accurate simulation of anchor seating loss.

Building Code Requirements for Structural Concrete (ACI 318-05) and Commentary (ACI 318R-05) CRC Press

Topics covered within this set of conference proceedings include: structural analysis - theory and methods; structural design - concept, technique and codes of practice; structural forms - concept and application; and construction of structures.

REINFORCED CONCRETE DESIGN 3E

Springer Science & Business Media

The design of structures in general, and prestressed concrete structures in particular, requires considerably more information than is contained in building codes. A sound understanding of structural behaviour at all stages of loading is essential. This textbook presents a detailed description and explanation of the behaviour of prestressed concrete members and structures both at service loads and at ultimate loads and, in doing so, provide a comprehensive and up-to-date guide to structural design. Much of the text is based on first principles and relies only on the principles of mechanics and the properties of concrete and steel, with numerous worked examples. However, where the design requirements are code specific, this book refers to the provisions of Eurocode 2: Design of Concrete Structures and, where possible, the notation is the same as in Eurocode 2. A parallel volume is written to the Australian Standard for Concrete Structures AS3600-2009. The text runs from an introduction to the fundamentals to in-depth treatments of more advanced topics in modern prestressed concrete structures. It suits senior undergraduate and graduate students and also practising engineers who want comprehensive introduction to the design of prestressed concrete structures. It retains the clear and concise explanations and the easy-to-read style of the first edition, but the content has been extensively re-organised and considerably expanded and updated. New chapters cover design procedures, actions and loads; prestressing systems and construction requirements; connections and detailing; and design concepts for prestressed concrete bridges. The topic of serviceability is developed extensively throughout. All the authors have been researching and teaching the behaviour and design of prestressed concrete structures for over thirty-five years and the proposed new edition of the book reflects this wealth of experience. The work has also gained much from Professor Gilbert active and long-time involvement in the development of standards for concrete buildings and concrete bridges.

Civil Engineering and Urban Planning IV

Thomas Telford

Concrete will be the key material for Mankind to create the built environment of the next millenium. The requirements of this infrastructure will be both demanding, in terms of technical performance and economy, and yet be greatly varied, from architectural masterpieces to the simplest of utilities. Innovation in Concrete Structures: Design and Construction forms the proceeding of the three day International Conference held during the Congress, Creating with Concrete, 6-10 September 1999, organised by the Concrete Technology University. Topics discussed include civil engineering structures, sub-structures, high-rise structures, deep basements, precast concrete construction and housing.

Strength and Behavior of Reinforced Concrete Slab-column Connections Subjected to Static and Dynamic Loadings CRC Press

Punching is considered to be one of the most difficult problems in structural concrete design and mechanical models or theoretical analyses were developed rather late in the history of concrete research attempts. This fib Bulletin reviews the development of design models and theoretical analyses since the CEB Bulletin 168 Punching Shear in Reinforced Concrete - State-of-the-Art Report published in 1985. The role of the concrete

tensile strength was specially addressed. In this respect the present bulletin is also following-up the CEB Bulletin 237 Concrete Tension and Size Effects - Utilisation of concrete tension in structural concrete design and relevance of size effect - Contributions from CEB Task Group 2.7 published in 1997. Apart from new theoretical developments a comprehensive databank for comparisons with experimental evidence is included. About 400 punching tests were critically reviewed and evaluated in a consistent manner. This is thought to be the first step towards a generally agreed selection of reliable tests. The evident value of such a data bank is illustrated by comparisons carried out between the data and some of the analytical proposals as well as empirical code formulas. List of contents : (1) Introduction, (2) Code equations, (3) Mechanical models for punching, (4) New developments for mechanical models, (5) Numerical investigations, (7) Comparison of mechanical models and test results of slabs without shear reinforcement, (8) Comparison of code rules and tests of flat slabs without shear reinforcement, (9) Comparison of codes, models and tests of flat slabs with shear reinforcement, (10) Experimental investigations, (11) Summary and conclusions, References, Appendices : (I) Databank on slabs without shear reinforcement, (II) Databank on slabs with shear reinforcement, (III) Comparison of test data with code rules, (IV) Comparison of test data with selected models, (V) Notations.