SECOND EDITION

Design of Blast-Resistant Buildings in Petrochemical Facilities

Task Committee on Blast-Resistant Design

ASCE

DESIGN OF BLAST-RESISTANT BUILDINGS IN PETROCHEMICAL FACILITIES

Second Edition

PREPARED BY
Task Committee on Blast-Resistant Design of the
Petrochemical Committee of the
Energy Division of the
American Society of Civil Engineers

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ASCE Petrochemical Energy Committee

This publication is one of five state-of-the-practice engineering reports produced, to date, by the ASCE Petrochemical Energy Committee. These engineering reports are intended to be a summary of current engineering knowledge and design practice, and present guidelines for the design of petrochemical facilities. They represent a consensus opinion of task committee members active in their development. These five ASCE engineering reports are:

1) *Design of Anchor Bolts in Petrochemical Facilities*
2) *Design of Blast Resistant Buildings in Petrochemical Facilities*
3) *Design of Secondary Containment in Petrochemical Facilities*
4) *Guidelines for Seismic Evaluation and Design of Petrochemical Facilities*
5) *Wind Loads for Petrochemical and Other Industrial Facilities*

The ASCE Petrochemical Energy Committee was organized by A. K. Gupta in 1991 and initially chaired by Curley Turner. Under their leadership the five task committees were formed. More recently, the Committee has been chaired by Joseph A. Bohinsky and Frank J. Hsiu. The five reports were initially published in 1997.

Buildings codes and standards have changed significantly since the publication of these five reports, specifically in the calculation of wind and seismic loads and analysis procedures for anchorage design. Additionally, new research in these areas and in blast resistant design has provided opportunities for improvement of the recommended guidelines. The ASCE has determined the need to update four of the original reports and publish new editions, based on the latest research and for consistency with current building codes and standards.

The ASCE Petrochemical Energy Committee was reorganized by Magdy H. Hanna in 2005 and the following four task committees were formed to update their respective reports:

- Task Committee on Anchor Bolt Design for Petrochemical Facilities
- Task Committee on Blast Design for Petrochemical Facilities
- Task Committee on Seismic Evaluation and Design for Petrochemical Facilities
- Task Committee for Wind Load Design for Petrochemical Facilities

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The ASCE Task Committee on Blast-Resistant Design

This report was prepared to provide guidance in the blast resistant design of petrochemical facilities. Though the makeup of the committee and the writing of this document are directed at petrochemical facilities, these guidelines are applicable to similar design situations in other industries. Those interested in this report should include structural design engineers with dynamic design training and experience as well as operating company personnel responsible to establish internal design and construction practices. The task committee was established because of a significant interest in the petrochemical industry in dealing with costly process accidents, in interpreting government safety standards, and in the desire to protect employees. One purpose of this report is to help provide some uniformity to the current mix of internal and published criteria.

This report is intended to be a State-of-the-Practice set of guidelines. The recommendations provided are based on published information and actual design. The report includes a list of references to provide additional information. The reference list emphasizes an emphasis on readily available commercial publications and government reports. Because of their relevance to this report, several publications deserve mention here. Two widely used documents dealing generally with blast resistant design are UFC 3-340-02 (formerly TM5-1300), *Structures to Resist the Effects of Accidental Explosions* from the Department of Defense and PDC-TR 06-08, *Single Degree of Freedom Structural Response Limits for Antiterrorism Design*, from the US Army Corps of Engineers' Protective Design Center.

In helping to create a consensus set of guidelines, a number of individual and groups provided valuable assistance and review. Reviewers included David Miller and Kieran Glynn. Assistance was also contributed by John Geigel, Anthony Emmons, and Sheng Wu.

Finally, the task committee would like to acknowledge the numerous contributions made to this task committee, the original report committee, and other technical committees over the years by James Lee. James passed away during the preparation of this report update.

The ASCE Task Committee on Blast-Resistant Design

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