

GP 04-03-02	Blast Resistant Buildings	March 2002
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Blast Resistant Buildings

GP 04-03-02

Scope

- 1) [I] This Global Practice (GP) covers the design of blast resistant buildings.
 - 2) [I] An asterisk (*) indicates that additional information from the Owner, or approval by the Owner, is required.
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1. Required References

[I] This Section lists Practices and Standards that are referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 04-03-01	Plant Buildings for Operation and Storage
GP 04-03-04	Special Category 3 Blast Resistant Buildings

1.2. ACI–American Concrete Institute

ACI 318/318R	Building Code Requirements for Structural Concrete and Commentary
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1.3. AISC–American Institute of Steel Construction

AISC S335	Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary
AISC S342L	Load and Resistance Factor Design Specification for Structural Steel Buildings

1.4. ASCE–American Society of Civil Engineers

ASCE BLAST	Design of Blast Resistant Buildings in Petrochemical Facilities
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* [I] Local codes and standards may be substituted for the ones referenced herein provided the following provisions are met:

- 1) The resultant design meets the safety and serviceability criteria attained through this GP.
- 2) Substitution is accepted by the authorities where the facility is to be located and by the Owner's Engineer.

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2. Additional References

* [I] The following Practices and Standards shall be used with this GP as applicable.

2.1. ACI–American Concrete Institute

ACI 530	Building Code Requirements for Concrete Masonry Structures
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2.2. AISI–American Iron and Steel Institute

AISI SG503	Design and Fabrication of Cold-Formed Steel Structures
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2.3. ASTM–American Society for Testing and Materials

ASTM A 36/A 36M	Standard Specification for Carbon Structural Steel
ASTM A 82	Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
ASTM A 653/A 653M	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 525/A 525M REV B	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 572/A 572M	Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A 615/A 615M	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 792/A 792M	Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM C 90	Standard Specification for Loadbearing Concrete Masonry Units
ASTM C 1048	Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass

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3. Definitions

Term	[I] Description
Vapor Cloud Explosion (VCE):	An incident producing a blast wave having a specified overpressure and duration. Three incidents are specified for the design of blast resistant buildings:
VCE #1	Characterized by high overpressure of relatively short duration, as specified in Table 1. The blast resistant building must withstand this VCE with a low response, as defined for Building Response below.
VCE #2	Characterized by low overpressure of relatively long duration, as specified in Table 1. The blast resistant building must withstand this VCE with a low response, as defined for Building Response below.
VCE #3	An extreme incident with high overpressure and relatively long duration. The blast resistant building must withstand this VCE with a high response, as defined for Building Response below.
Building Categories	* Buildings are categorized for the purpose of blast resistant design based on spacing from a credible VCE hazard. Spacing category for blast resistant building will be specified.
Blast Resistant Buildings	Shall be capable of resisting, in any direction, the applicable design vapor cloud explosions as follows: a) Critical operations buildings shall be designed to withstand VCE #1 and VCE #2. In addition, if normally occupied, they shall be designed to withstand VCE #3. b) Other normally occupied buildings shall be designed to withstand VCE #3. * The building classification of critical and/or occupied will be specified by the Owner.
Dynamic Resistance or Equivalent Static Load	The structural strength required or the capacity provided to permit a structural component to resist the effects of the blast loadings within the specified deformation limits.
Building Response	The following descriptions apply to the response of buildings from a VCE event: a) Low Response: Localized building/component damage. Building can be used; however, repairs are required to restore integrity of structural envelope. b) High Response: Building/component damage is at the limit of structural integrity. Additional loading (subsequent to blast pressure) due to environmental conditions (i.e., wind, snow, rain) may lead to collapse.