

GP 04-03-04	Special Category 3 Blast Resistant Buildings	February 2002
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Special Category 3 Blast Resistant Buildings

GP 04-03-04

Scope

[I] This Global Practice (GP) covers the structural design of certain Category 3 type plant buildings for a prescribed level of blast resistance in lieu of using the explicit blast resistant design requirement of [GP 04-03-02](#).

[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, Standards, Codes, and Specifications 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
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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 for Steel Construction

AISC S335	Specification for Structural Steel Buildings Allowable Stress Design and Plastic Design with Commentary
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2. Additional References and Requirements

- 1) * [I] The following Practices and Standards shall be used with this Practice as specified by the Owner's Engineer.
- 2) * [I] Local codes and standards may be substituted for the ones referenced herein provided the following provisions are met:
 - a) The resultant design meets the safety and serviceability criteria attained through this Practice.
 - b) Substitution is accepted by the authorities where the facility is to be located and by the Owner's Engineer.

2.1. Global Practices–ExxonMobil Engineering Practices

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2.2. ACI–American Concrete Institute

ACI 530	Building Code Requirements for Concrete Masonry Structures
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2.3. American Iron and Steel Institute

AISI SG-673 PART I	Specification for the Design of Cold-Formed Steel Structural Members
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2.4. 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 446/A 446M	Standard Specification for Steel Sheet, Zinc-Coated (galvanized) by the Hot Dip process, Structural (Physical Quality) (Withdrawn)
ASTM A 525	Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process (Withdrawn)
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

3. Definitions

Term	[I] Description
*Special Category 3 Blast Resistant Buildings	Buildings specified by the Owner as requiring a level of blast resistance, corresponding to a Category 3 VCE #3 per GP 04-03-02 , that can be achieved by the conventional design and construction requirements specified in this Practice.
Working blast load	The equivalent static service load used for the design of building components for blast effects based on normal allowable stresses.
Girts and Purlins	The horizontal structural members which directly support the wall and roof cladding, respectively, in a building.
Roof diaphragm	The structural system which transfers lateral loads in the plane of the building roof to the walls or frames.
Shear Wall	Transfers lateral loads through the plane of the wall to the foundation or other structural support

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4. Design

4.1. General

- 1) [I] Special Plant Buildings satisfying the limitations specified in Section 4.1, Item 2 and Item 3 may be designed and constructed in accordance with the additional requirements of this Practice. Other Category 3 building structural systems not covered in Section 4.1, Item 2 and Item 3 shall be designed in accordance with [GP 04-03-02](#).
- 2) [I] Building structural systems covered by this Practice are as follows:
 - a) Metal building with steel frame and steel cladding.
 - b) Steel framed building with reinforced concrete or reinforced masonry exterior walls and a reinforced concrete roof.
 - c) Multiple span frame building, concrete frame building, building with reinforced concrete or reinforced masonry exterior walls in combination with steel clad roof, and building with steel wall cladding in combination with a reinforced concrete roof are not covered by this Practice.
- 3) [I] Building construction shall comply with the following general requirements:
 - a) One-story with wall height not exceeding 20 ft (6 m).
 - b) Exterior walls shall not be used to support the roof loads.
 - c) Roof slope shall not exceed 1 vertical to 12 horizontal.
 - d) Lateral load carrying systems shall be reinforced concrete or reinforced masonry shear walls, rigid steel frames, or diagonally braced steel framing. Rigid steel frames shall be single span.
 - e) Girder spans between supports shall not exceed 50 ft (15 m).
- 4) [S], [I] Structural components shall be designed for the conventional load (dead, live, wind or earthquake) and working blast load combinations, whichever is governing. The working blast load shall be applied as an inward pressure on the building component. The load combinations shall be as follows:
 - a) Dead load + live load + wind load or earthquake load.
 - b) Dead load + live load (where applicable) + working blast load.
 - c) Dead load – 0.5 x working blast load.
- 5) [S], [I] Safety factors, load factors, or allowable stresses shall be in accordance with applicable codes and standards. Working blast loads shall be considered as live loads for the determination of load factors and allowable stresses.

[I], [R] Deflection limits for conventional load combinations per Section 4.1, Item 4a shall be according to the applicable codes. They shall not apply to the working blast load combinations per Section 4.1, Items 4b and 4c.
- 7) [I] Working blast loads provided are for the design of the individual component and its connections and shall not be used in the design of other supporting components/portions except as explicitly stated.
- 8) [I] Roof diaphragms, shear walls and foundations shall be designed for the reactions from the supported elements.

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