heights, wave periods, and water depth at the installation site.

[53 FR 10690, Apr. 1, 1988; 53 FR 26067, July 11, 1988. Redesignated and amended at 63 FR 29479, 29486, May 29, 1998]

§ 250.906 General design requirements.

(a) *General.* This section specifies the general concepts and methods of analysis to be incorporated in the design of a platform.

(b) *Analytical approaches.* (1) Structural response information including the following:

(i) Methods of analysis employed in association with the specifications of these requirements shall treat geometric and material nonlinearities in a defensible manner. When nonlinear methods of analysis are used to assess collapse mechanisms, it shall be demonstrated that the platform has sufficient ductility to develop the required resistance or structural displacements.

(ii) Where theoretically based analytical procedures covering the platform or parts thereof are unavailable or not well defined, model studies shall be utilized. The acceptability of model studies depends on the procedures employed, including enumeration of the possible sources of errors, the limits of applicability of the model test results, and the methods of extrapolation to full-scale data.

(2) Loading format information including the following:

(i) Either a deterministic or spectral format shall be employed to describe various load components. When a static approach is used, it shall be demonstrated, where appropriate, that the general effects of dynamic amplification were addressed. The influence of waves other than the highest waves shall be investigated for their potential to produce maximum peak stresses resulting from possible resonance with the platform.

(ii) When considering the design earthquake as discussed in § 250.905 of this part, a dynamic analysis shall be performed. A dynamic analysis shall also be performed to assess the effects of environmental or other types of loads if significant dynamic amplification is expected.

(iii) For fatigue analysis, the long-term distribution of the stress range, with proper consideration of dynamic effects, shall be obtained for relevant loadings anticipated during the design life of the platform (see §§ 250.907(c)(6) and 250.908(c)(6) of this part).

(3) Combinations of loading components information including the following:

(i) Loads imposed during and after installation shall be taken into account. Of the various loads described in § 250.905, of this part, those loads to be considered for design shall be combined in a manner consistent with their probability of simultaneous occurrence. However, earthquake loadings shall be applied without consideration of other environmental effects unless conditions at the site necessitate their inclusion. The direction of applied environmental loads shall be that producing the highest possible influences on the platform, considering the platform's orientation and location with respect to bottom topography, direction of fetch, and nearby land masses.

(ii) While it is required to obtain and use those loading components which produce realistic maximum effects on the platform, loading combinations corresponding to conditions after installation shall reflect both operating and design environmental loadings. Sections 250.907, 250.908, and 250.909 of this part give the minimum load combinations to be considered.

(iii) The operating environmental conditions and the maximum tolerable environmental loads during installation shall be specified.

(c) *Overall design considerations.* (1) *Design life.* The design service life of the platform shall be specified as prescribed in § 250.904(c)(2)(iv) of this part.

(2) *Air gap.* An air gap of 5 feet shall be provided between the maximum crest elevation of the design wave (including tidal effects) and the lowest portion of the platform upon which wave forces have not been included in the design. After accounting for the initial and long-term settlements resulting from consolidation and subsidence, the elevation of the crest of the design wave shall be based on the elevation of the mean low-water line, astronomical and storm tides, wave runup, the tilting of the platform, and where necessary, tsunamis.

(3) *Long-term and secondary effects.* The following effects shall be addressed, as appropriate, for the planned platform:

(i) Local vibration due to machinery, equipment, and vortex shedding;

(ii) Stress concentrations at critical joints;

(iii) Secondary stresses induced by large deflections (P-Δ effects);

(iv) Cumulative fatigue;

(v) Corrosion;

(vi) Marine growth; and

(vii) Ice abrasion.

(4) *General arrangement.* The platform and equipment shall be arranged to minimize the potential of structural damage and personal injury resulting from accidents. In this regard, the consequences of the arrangement or placement of the following components and their effects shall be addressed:

(i) Equipment and machinery—noise and vibration,

(ii) High-pressure piping—leakage in closed spaces,

(iii) Lifting devices—dropped loads, and

(iv) Vessel mooring devices—line breakage and tripping quick-release mechanisms.

(5) *Corrosion-protection zones.* Measures taken to mitigate the effects of corrosion as required by §§ 250.907(d) and 250.908(c)(5) of this part shall be specified and described in terms of the following definitions for corrosion-protection zones:

(i) Submerged zone—that part of the platform below the splash zone,

(ii) Splash zone—that part of the platform between the highest and lowest water levels reached by sea states exceeded for 1 percent of the time annually when superimposed on the highest and lowest levels of tide with due allowance for high and low installation of the platform,

(iii) Atmospheric zone—that part of the platform above the splash zone,

(iv) Ice zone—that part of the platform which can reasonably be expected to come into contact with floating or submerged ice annually.

[53 FR 10690, Apr. 1, 1988; 53 FR 26067, July 11, 1988. Redesignated and amended at 63 FR 29479, 29486, May 29, 1998; 63 FR 34597, June 25, 1998]

§ 250.907 Steel platforms.

(a) *Materials*—(1) *General.* (i) This section covers specifications for materials used for the construction of steel pile-supported platforms. Steels shall be suitable for their intended service as demonstrated by testing under relevant service conditions or previous satisfactory performance under service conditions similar to those intended. Steels shall be of good commercial quality, defined by specification, and free of injurious defects.

(ii) Steels shall exhibit satisfactory formability and weldability characteristics and fracture toughness satisfactory for the intended applications. Materials for structural members which are fracture critical or for members which sustain significant tensile stress and whose fracture would pose a threat to the survival of the platform shall have sufficient toughness to guard against brittle fracture. Materials selected for members which are subjected to significant tensile stress shall have toughness suitable to their intended application.

(iii) In cases where principal loads from either service or weld residual stresses are imposed normal to the plate, appropriate precautions shall be taken to avoid lamellar tearing parallel to the plate surface.

(2) Material selection information including the following:

(i) Steels for structural members shall be selected according to criteria that take into account the required yield strength, fracture toughness, service temperature (see paragraph (a)(3) of this section), and intended application;

(ii) Bolts and nuts shall have mechanical and corrosion properties comparable to the structural elements being joined. Materials for bolts and nuts shall be defined by and tested in accordance with material standards compatible with those for the joined structural members;

(iii) When new alloys are used, the adequacy of fracture toughness shall be supported by appropriate fracture tests; and

(iv) When materials other than steel are used for structural purposes, the mechanical and durability properties necessary for their intended function