NF-3142 Plate- and Shell-Type Supports — Analysis Procedure

NF-3142.1 Elastic Analysis.
(a) Elastic analysis used in the design of Plate- and Shell-Type Supports of Class 1 construction shall be based on maximum shear stress theory in accordance with the rules of NF-3200.
(b) Elastic analysis used in the design of Plate- and Shell-Type Supports of Class 2, 3, and MC construction shall be based on maximum stress theory. Supports for Class 2 vessels designed to NC-3200 shall be designed in accordance with Class 1 requirements.

NF-3142.2 Limit Analysis.
(a) Limit analysis used in the design of Plate- and Shell-Type Supports of Class 1 construction shall be in accordance with the procedures of NF-3221.4.
(b) Limit analysis used in the design of Plate- and Shell-Type Supports of Class 2, 3, and MC construction shall be in accordance with the procedures of NF-3251.4.

NF-3143 Linear-Type Supports — Analysis Procedure

(a) The analysis procedure shall comply with (1) or (2).
(1) Elastic analysis based on maximum stress theory in accordance with the rules of NF-3300 shall be used for the design of Linear-Type Supports for Class 1, 2, 3, and MC construction.
(2) Limit analysis in accordance with the procedures of NF-3340 shall be used in the design of Linear-Type Supports for Class 1, 2, 3, and MC construction.
(b) High cycle fatigue analysis in accordance with procedures of NF-3330 shall be used in the design of Linear-Type Supports for Class 1 construction when members and their connections are subject to high cycle fatigue as defined in NF-3331.

NF-3144 Standard Supports — Analysis Procedure

Standard Supports designed by analysis shall be designed to either the requirements of NF-3142 or NF-3143, according to whether they are Plate- and Shell-Type or Linear-Type Standard Supports.

NF-3200 DESIGN RULES FOR PLATE- AND SHELL-TYPE SUPPORTS

NF-3210 GENERAL REQUIREMENTS

NF-3211 Basis for Determining Stresses in Design by Analysis

The theory of failure used in the rules of this Subsection for combining stresses for the design of Class 1 Plate- and Shell-Type Supports is the maximum shear stress theory; for Class 2, 3, and MC Plate- and Shell-Type Supports, it is the maximum stress theory.

NF-3212 Definitions

Terms used in the design of Plate- and Shell-Type Supports by stress analysis are defined in NF-3121 and in NF-3212.1 below.

NF-3212.1 Stress Intensity. Stress intensity is defined as twice the maximum shear stress which is the difference between the algebraically largest principal stress and the algebraically smallest principal stress at a given point.

This definition of stress intensity is not related to the definition of stress intensity applied in the field of fracture mechanics.

NF-3220 DESIGN BY ANALYSIS FOR CLASS 1

NF-3221 Stress Limits

Stress limits for elements of Class 1 supports are given in this paragraph. Stress limits for bolts and welds are given in NF-3225 and NF-3226. General requirements concerning stress determinations, definitions, derivations of stress intensities, and classification of stresses are given in NF-3210.

Plate- and Shell-Type Supports may be designed by either elastic or limit analysis, stress intensity limits for which are given in NF-3221.1 through NF-3221.4.

NF-3221.1 Design Limits. The stress intensity limits which must be satisfied for the Design Loadings stated in the Design Specification are the two limits of this paragraph and the Special Stress Limits of NF-3223. The design stress intensity values $S_m$ are given in NF-3224.

(a) General primary membrane stress intensity $P_m$ is derived from the average value across the thickness of a section of the general primary stresses produced by specified Design Mechanical Loads, but excluding all secondary stresses. Averaging is to be applied to the stress components prior to determination of the stress intensity values. The allowable value of this stress intensity is $S_m$ at the Design Temperature.

(b) Primary membrane plus primary bending stress intensity $P_m + P_b$ is derived from the highest value across the thickness of a section of the general membrane stresses plus primary bending stresses produced by the specified Design Mechanical Loads, but excluding all secondary stresses. The allowable value of this stress intensity is $1.5 S_m$.