GUIDE FOR

SPECTRAL-BASED FATIGUE ANALYSIS FOR FLOATING PRODUCTION, STORAGE AND OFFLOADING (FPSO) INSTALLATIONS
MAY 2010

NOTICE NO. 1 – February 2013

The following changes become **EFFECTIVE AS OF 1 FEBRUARY 2013.**

(See http://www.eagle.org for the consolidated version of the Guide for Spectral-Based Fatigue Analysis for Floating Production, Storage and Offloading (FPSO) Installations, 2010, with all Notices and Corrigenda incorporated.)

Notes - The date in the parentheses means the date that the Rule becomes effective for new construction based on the contract date for construction. (See 1-1-4/3.3 of the ABS Rules for Conditions of Classification – Offshore Units and Structures (Part 1).)

SECTION 8 FATIGUE STRENGTH

(Revise Subsection 8/3, as follows.)

3 S-N Data *(1 February 2013)*

Section 3 of the ABS *Guide for the Fatigue Assessment of Offshore Structures* provides S-N curves for non-tubular details, tubular joints and cast steel components. Each set of curves can be adjusted for thickness effect and adjustments are provided to reflect corrosion effects. Three corrosive conditions are considered: in-air, cathodically protected in seawater, and free corrosion in seawater. For cast steel components "in-air" S-N curve is given.

There are other adjustments that could be considered to increase fatigue capacity above that portrayed by the cited S-N data. These include adjustments for "mean stress" effects, a high compressive portion of the acting cyclic stress and the use of "weld-improvement" techniques. The first two of these adjustments are not permitted, primarily because they may violate the calibration and validation that was performed in the development of the recommended fatigue strength criteria.

The use of a weld-improvement technique, such as weld toe grinding or peening to relieve ambient residual stress, can be effective in increasing fatigue life. However, credit should not be taken for such a weld improvement in the design phase of the structure. Consideration for granting credit for the use of weld-improvement techniques should be reserved for situations arising during construction, operation or future reconditioning of the structure. An exception may be made if the target design fatigue life cannot be satisfied by other preferred design measures such as refining layout, geometry, scantlings and welding profile to minimize fatigue damage due to high stress concentrations. Grinding or ultrasonic/hammer peening can be used to improve fatigue life in such cases.

Grinding is preferably to be carried out by rotary burr and to extend below the plate surface in order to remove toe defects and the ground area is to have effective corrosion protection. The treatment is to produce a smooth concave profile at the weld toe with the depth of the depression penetrating into the plate surface to at least 0.5 mm below the bottom of any visible undercut. The depth of groove produced is to be kept to a minimum, and, in general, kept to a maximum of 1 mm. In no circumstances is the grinding depth to exceed 2 mm or 7% of the plate gross thickness, whichever is smaller. Grinding has to extend to areas well outside the highest stress region.

The finished shape of a weld surface treated by ultrasonic/hammer peening is to be smooth and all traces of the weld toe are to be removed. Peening depth below the original surface is to be maintained at least 0.2 mm. Maximum depth is generally not to exceed 0.5 mm. Provided these recommendations are followed, a credit of 2 on fatigue life may be permitted when suitable toe grinding or ultrasonic/hammer peening are provided.

Where an improvement technique is applied, full details of the grinding standard including the extent, profile smoothness particulars, final weld profile, and improvement technique workmanship and quality acceptance criteria are to be clearly shown on the applicable drawings and submitted for review together with supporting calculations indicating the proposed factor on the calculated fatigue life.