GUIDE FOR

SPECTRAL-BASED FATIGUE ANALYSIS FOR VESSELS JUNE 2016

NOTICE NO. 1 – February 2017

The following changes were approved by the ABS Rules Committee on 14 February 2017 and become **EFFECTIVE AS OF 15 FEBRUARY 2017.**

(See http://www.eagle.org for the consolidated version of the Guide for Spectral-Based Fatigue Analysis for Vessels, 2016, 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 (Part 1).)*

SECTION 6 FATIGUE STRENGTH ASSESSMENT

(Revise Subsection 6/3, as follows.)

3 S-N Data *(15 February 2017)*

To provide a ready reference, the S-N Data recommended by ABS are given in Appendix 1 of this Guide. (*Note:* source United Kingdom's Dept of Energy (HSE) Guidance Notes, 4th Edition.)

It may be necessary to make adjustments to the S-N data to reduce the fatigue capacity of the detail in some instances. Conversely, if the detail has characteristics beneficial to fatigue performance, the S-N data may be adjusted to increase its fatigue capacity.

A reduction in fatigue capacity may be required to account for factors such as the absence of corrosion protection (coating) for structural steel or relatively large plate thickness. The reduction is to be done in accordance with standard ABS practice. The fatigue capacity of a detail may be increased to account for conditions such as compressive mean stress effects – a high compressive portion of the acting variable stress range – or the use of weld improvement techniques.

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, such effects should not be considered in the design of the structure. Typically, an increase in fatigue capacity through weld improvement techniques will be considered only for situations arising during construction, operation or future reconditioning of the structure. If the design fatigue life cannot be obtained using preferred design measures such as layout refinement, geometric changes, scantling adjustment or weld profile modification to reduce fatigue damage, an exception may be granted.

Weld improvement techniques such as weld toe grinding or ultrasonic peening may be used to improve fatigue life only if the calculated fatigue life is sufficient when the weld improvement techniques are not considered. The required calculated fatigue life without considering weld improvements for various design fatigue lives are listed in the table below:

Design Fatigue Life	*Calculated Fatigue Life without Considering Weld Improvements*
20 years	15 years
25 years	17 years
Greater than 25 years	Greater than $^2/_3$ design fatigue life

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

Grinding is to produce a smooth concave profile at the weld toe with a penetration depth of at least 0.5 mm into the plate surface below the bottom of any visible undercut. It is preferable that a rotary burr be used and that the grinding extend below the plate surface in order to remove toe defects. The ground area is to have effective corrosion protection. The groove depth is to be minimized and generally should not exceed 1 mm. In no circumstances may the grinding depth exceed the lesser of 2 mm or 7% of the plate gross thickness. The grinding area is to extend well beyond the high stress region.

A weld surface treated using ultrasonic peening should have a smooth finished shape and all traces of the weld toe are to be removed. The minimum peening depth is to be 0.2 mm below the original surface. Generally, the maximum peening depth is 0.5 mm.

A maximum fatigue life improvement of 2 times may be granted provided the above recommendations are followed.