2019 Interim Revisions to the LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

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AASHTO

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2019 INTERIM REVISIONS INSTRUCTIONS AND INFORMATION

General

AASHTO has issued proposed interim revisions to the *LRFD Structural Supports for Highway Signs, Luminaires, and Traffic Signals*, First Edition (2015). This packet contains the revised pages. They are designed to replace the corresponding pages in the book.

Affected Articles

Underlined text indicates revisions that were approved in 2018 by the AASHTO Committee on Bridges and Structures. ~~Strikethrough text~~ indicates any deletions that were likewise approved by the Committee. A list of affected articles is included below.

All interim pages are displayed on a yellow background to make the changes stand out when inserted in the first edition binder. They also have a page header displaying the interim publication year. Please note that these pages may also contain nontechnical (i.e., editorial) changes made by AASHTO publications staff; any changes of this type will not be marked in any way so as not to distract the reader from the technical changes.

2019 Changed Articles

SECTION 5: STEEL DESIGN
5.6.6.1
5.6.7

SECTION 11: FATIGUE DESIGN
11.9.2

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Stiffeners having a transition radius shall not be used.

Alternative stiffener geometries, stiffener spacing, and weld termination angles on the tube shall be approved by the Owner based upon evaluation, analysis, testing, or acceptable field performance, singly or in combination.

thin stiffeners can reduce distortion of the tube but fail to sufficiently reduce the stress at the fillet-weld and can cause fatigue cracking through the throat of the stiffener-to-transverse plate weld.

A ratio of stiffener thickness to tube thickness of 1.25 provides an optimum solution with equal likelihood of fatigue cracking at the stiffener termination and at the tube-to-transverse-plate weld.

Decreasing the ratio of the stiffener height to stiffener spacing reduces protection to the fillet-weld. An optimum solution is obtained when the stiffener height is about 1.6 times the stiffener spacing.

Reducing the termination angle of the stiffener on the tube wall improves the fatigue performance of stiffened connections. Using a stiffener termination angle of 15 degrees ensures that the stiffener sections are fully effective in sharing load.

Stiffeners with a transition radius at the termination on the tube wall are fabrication intensive and are expected to be costlier than a tapered alternative. To avoid exposure of the lack of fusion at the weld root in fillet welds and partial-penetration groove welds, a stiffener termination with a transition radius must be groove welded, which requires non-destructive inspection in the vicinity of weld termination. It is difficult to grind the weld toe without inadvertently thinning the tube at the transition.

The stiffened groove-welded tube-to-transverse-plate connection is unlikely to be cost-effective and is excluded from this specification.

Figures of stiffeners are illustrated in Table 11.9.3.1-1. (Detail 6.2 and 6.3)

5.6.5—Backing Ring

For full-penetration groove-welded tube-to-transverse-plate connections, the thickness of the backing ring shall not exceed $^1/_4$ in. The height of the backing ring, when welded to the tube at the top prior to performing ultrasonic inspection of the groove weld, shall be as given by Eq. 5.6.5-1, rounded to the nearest integer:

$$H = 2t\left(\tan\theta\right) + R \qquad (5.6.5\text{-}1)$$

where:

H = height of backing ring at a groove-welded tube-to-transverse-plate connection (in.),

R = root gap at a groove-welded tube-to-transverse-plate connection (in.),

θ = angle of the sound beam for ultrasonic inspection of groove welds (degrees), and

t = the tube wall thickness (in.).

C5.6.5

In full-penetration groove-welded tube-to-transverse-plate connections with the backing ring welded to the plate and the tube wall, fatigue cracking can occur both at the groove-weld toe and the backing ring top weld toe on the tube wall. Depending on the diameter and thickness of the tube, and the height and thickness of the backing ring, the backing ring can participate in transferring forces from the tube to the transverse plate and can introduce variability in the fatigue performance of the connection. Providing a 2 in. × $^1/_4$ in. backing ring limits this participation to a reasonable level in typical support structures.

However, when the backing ring is welded to the tube at the top, this weld interferes with the ultrasonic inspection of the groove weld by allowing the sound wave to travel from the outside of the shaft through the weld into the backing ring. The sound wave then gets trapped in the backing ring and does not reach the groove weld. For a successful inspection, the weld at the top of the backing ring should be above the centerline of the probe. According to AWS D1.1, the ultrasonic beam should bounce at least once to the area of inspection,

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