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Method of Assessment for Flaws in Fusion Welded Joints with Respect to Brittle Fracture and Fatigue Crack Growth

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Revised on October 1, 2011

The Japan Welding Engineering Society (JWES)

In the event of any doubt arising,
the original standard in Japanese is to be final authority.

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Review Committee: JWES Standardization Committee (Chairman: KOMIYAMA, Teruhiko)

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Contents

WES 2805 : 2007
Japan Welding Engineering Society Standard

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Introduction

This standard describes the guidelines for the method of assessing the acceptability of flaws in welded structures detected by various non-destructive tests during manufacturing or use. The method assesses flaws according to the functions required for structural elements from the viewpoints of fitness-for-purpose, taking full account of the service conditions of the structural elements concerned. It is a practical, simplified method, based on the results of previous studies on fracture mechanics. The standard was issued in 1976, partly revised in 1980, and completely reviewed and revised in 1997. The present edition is revised and updated from the 1997 version, based on the results of the latest development in related fields such as elastic-plastic fracture mechanics, toughness assessment methods, reliability engineering, etc.

1. Scope

This standard applies to general welded steel structures, specifying the method for assessing the brittle fracture from cracks or similar planar flaws and for assessing the damage or brittle fracture caused by the fatigue crack growth from various types of flaws in fusion welded joints.

When assuming that the final form of damage is brittle fracture, only the flaws existing in the stress concentration areas of structural elements, i.e. those surrounded by elastic stress fields, are assessed. When through-thickness flaws exist in planar joints, this standard only applies to the cases of fatigue crack growth. A pure application of fracture mechanics is sufficient to assess such relatively simple cases.

2. Reference Standards

The following standards consist of part of this standard when they are cited in the standard. The latest versions are applicable.

JIS G 0202 Glossary of terms used in iron and steel (Testing)

JIS Z 3001 Welding terms

WES 1108 Standard test method for crack-tip opening displacement fracture toughness measurement

WES 1109 Guideline for crack-tip opening displacement (CTOD) fracture toughness test method of weld heat-affected zone

WES 2808 Method of assessing brittle fracture in steel weldments subjected to large cyclic and dynamic strain