

AN INTERNATIONAL CODE

2010 ASME Boiler & Pressure Vessel Code

2011a Addenda

July 1, 2011

ASME does not "approve," "rate," or "endorse," any item, construction, proprietary device, or activity. ASME does not take any position with respect to the validity of any patent rights asserted in connection with any item mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

XI

RULES FOR INSERVICE INSPECTION OF NUCLEAR POWER PLANT COMPONENTS

ASME Boiler and Pressure Vessel Committee
on Nuclear Inservice Inspection



The American Society of
Mechanical Engineers

Three Park Avenue • New York, NY • 10016 USA



X01111

NONMANDATORY APPENDIX C EVALUATION OF FLAWS IN PIPING

ARTICLE C-1000 INTRODUCTION

C-1100 SCOPE

This Article provides the general scope and application of the evaluation methodology for flawed pipe.

(a) This Appendix provides a method for determining the acceptability for continued service of piping containing flaws that exceed the acceptance standards of IWB-3514 or IWC-3514. The evaluation methodology is based on the following conditions that govern pipe failure.

(1) Limit load (fully plastic) analysis of the pipe cross-section which is reduced by the flaw area, for ductile materials when the ability to reach limit load is assured.

(2) Elastic-plastic fracture mechanics when ductile flaw extension occurs prior to reaching limit load.

(3) Linear elastic fracture mechanics for brittle fracture conditions. The procedures are applicable to flaws in weld materials or base material as defined in Fig. C-1100-1.

(b) This Appendix provides a screening procedure to determine the failure mechanism based on metal temperature, applied loads, flaw size, and material properties. Flaws are evaluated by comparing the maximum flaw dimensions at the end of the evaluation period with the allowable flaw size, or by comparing the applied pipe stress with the allowable stress for the flaw size at the end of the evaluation period.

(c) This Appendix also provides procedures for flaw modeling and evaluation. Flaw growth analysis is based on fatigue. When stress corrosion cracking (SCC) is active, the growth shall be added to the growth from fatigue. The flow acceptance criteria of C-2600 include structural factors on failure for the three failure mechanisms described in (a). The acceptance criteria shall be used to determine acceptability of the flawed piping for continued service for a specified evaluation time period or to determine the time interval until a subsequent inspection.

Figure C-1100-1
Weld Material–Base Material Interface Definition for Flaw Location

