

TITLE: Component Integrity Implications from Creep Damage Tolerance and Fracture Characteristics of Creep Strength Enhanced Ferritic Steels

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ABSTRACT:

Creep Strength Enhanced Ferritic Steels (CSEF) are an important class of alloys used in high temperature components of power generating plants. These steels, while having excellent high temperature strength, can exhibit variable creep ductility and fracture tolerance due to undesirable metallurgical features. Methods for component assessment must capture this variability in behavior which can result in quite different failure times and modes. Examples are provided from multiaxial laboratory tests and failed components to illustrate variability in creep fracture behavior and application of integrity assessment methods. This illustrates the importance of understanding creep damage evolution, particularly for welded components, and shows how rapid fracture can occur in some circumstances. The implications for component life management and fitness-for-service are outlined with some practical examples.