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AEROSPACE RECOMMENDED PRACTICE

ARP 1110

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Revised

MINIMIZING STRESS CORROSION CRACKING IN HEAT TREATABLE WROUGHT LOW ALLOY AND MARTENSITIC CORROSION RESISTANT STEELS

1. PURPOSE:

1.1 The purpose of this recommended practice is to provide the aerospace industry with recommendations concerning minimizing of stress corrosion cracking in heat treatable wrought low alloy and martensitic corrosion resistant steel products.

1.2 The detailed recommendations are based on laboratory and field experience and reflect those design practices and fabrication procedures which should avoid in-service stress corrosion cracking of low alloy and martensitic corrosion resistant steels.

2. DEFINITIONS:

2.1 For the purpose of this document, the term stress corrosion cracking will be used to describe in a broad sense failure that occurs either by this mechanism or by hydrogen embrittlement.

3. GENERAL:

Stress corrosion failures of wrought low alloy and corrosion resistant steels are generally caused by the following combination of factors:

a. Presence of a sustained surface tensile stress as a result of applied stresses, assembly stresses, and/or residual stresses due to heat treating or forming or plane strain produced by the tensile stresses concentrated at the root of a pre-existing crack or other notches. (Note: Sustained stress is used to differentiate from dynamic or cyclic stress, which under corrosive conditions may result in corrosion fatigue.)

b. Existence, in the product, of a metallurgical condition which makes the product susceptible to stress corrosion cracking.

c. Corrosive media which are conducive to crack initiation and/or propagation.

3.1 Heat treatable low alloy steels may be susceptible to stress corrosion cracking in the following environments:

a. Acid solutions.
b. Seawater.
c. Alkali metal hydroxides.
d. Marine and industrial atmospheres.
e. Plating solutions.
f. Alkali metal nitrates.