



AEROSPACE RECOMMENDED PRACTICE

ARP1110™**REV. D**

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Revised 2021-01

Superseding ARP1110C

Minimizing Stress Corrosion Cracking in Wrought Forms of Steels and Corrosion Resistant Steels and Alloys

RATIONALE

ARP1110D is a Five-Year Review and update of this specification that revises Table 1 and adds heat treatment to 5.5.

1. SCOPE

The purpose of this SAE Aerospace Recommended Practice (ARP) is to provide the aerospace industry with recommendations concerning the minimization of stress corrosion cracking in wrought heat-treatable carbon and low alloy steels and in austenitic, precipitation hardenable, and martensitic corrosion-resistant steels and alloys.

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.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2430	Shot Peening
AMS2431	Peening Media, General Requirements
AMS2432	Shot Peening, Computer Monitored

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Documents

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2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM G49 Preparation and Use of Direct Tension Stress-Corrosion Test Specimens

ASTM G58 Preparation of Stress Corrosion Test Specimens for Weldments

2.1.3 Other Publications

Damage Tolerant Design Handbook, MCIC-HB-01, Air Force Materials Lab, Air Force Flight Dynamics Laboratory.

Aerospace Structural Metals Handbook (formerly AFML-TR-68-115), CINDAS/Purdue University, West Lafayette, IN 47907.

Deformation and Fracture Mechanics of Engineering Materials, Richard W. Hertzberg, Materials Research Center, Lehigh University, Wiley Publishing, ISBN 0471012149.

Corrosion Engineering, Fontana and Greene, McGraw-Hill Book Company, ISBN 0072939737.

2.2 Definitions

2.2.1 STRESS CORROSION CRACKING

The combined action of sustained tensile stresses and corrosion to cause premature failure (see 5.2).

2.2.2 The relative resistance of a material and its thermomechanical condition (heat treatment or degree of work hardening) to stress corrosion cracking is characterized by the following terms:

2.2.2.1 LOW RESISTANCE TO STRESS CORROSION CRACKING

The material and condition are generally susceptible to stress corrosion cracking.

2.2.2.2 MODERATE RESISTANCE TO STRESS CORROSION CRACKING

The material and condition are not generally susceptible to stress corrosion cracking, but conditions of high stress or aggressive environments have been shown to result in stress corrosion cracking.

2.2.2.3 HIGH RESISTANCE TO STRESS CORROSION CRACKING

The material and condition are not likely to exhibit stress corrosion cracking under a wide range of exposure environments.

3. GENERAL

3.1 The following three conditions must be present for stress corrosion cracking to occur:

- a. An alloy and material condition that is susceptible to stress corrosion cracking.
- b. A sustained or residual tensile stress that, especially if associated with geometric features (e.g., notches, corners) or surface discontinuities, generates a stress intensity that exceeds the threshold for the specific alloy/condition/environment combination.
- c. A specific corrosive environment that the alloy and material condition is susceptible.