SAE INTERNATIONAL

# AEROSPACE RECOMMENDED PRACTICE

ARP823™ REV. F

Issued 1964-01
Revised 2019-04

Superseding ARP823E

## Minimizing Stress-Corrosion Cracking in Wrought High-Strength Aluminum Alloy Products

RATIONALE

ARP823F revises the title to include “high-strength” alloys and results from a Five-Year Review and update of this recommended practice. Information was reorganized in Sections 3 and 4, but no new data was introduced.

## 1. SCOPE

1.1 The purpose of this recommended practice is to provide the aerospace industry with recommendations concerning minimizing stress-corrosion cracking (SCC) in wrought high-strength aluminum alloy products.

1.2 The detailed recommendations are based on practical engineering experience and reflect those design practices and fabricating procedures which have been found to be most effective in minimizing stress-corrosion cracking in wrought high-strength aluminum alloy products.

1.3 This ARP provides general guidelines. For further information, see references in 4.3.

## 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.

| | |
|---|---|
| AMS2770 | Heat Treatment of Wrought Aluminum Alloy Parts |
| AMS2771 | Heat Treatment of Aluminum Alloy Castings |
| AMS2772 | Heat Treatment of Aluminum Alloy Raw Materials |
| AMS3065 | Compound, Corrosion Preventive Thin Film, Fingerprint Removing |



**TO PLACE A DOCUMENT ORDER:** Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
**SAE WEB ADDRESS:** http://www.sae.org

**SAE values your input. To provide feedback on this Technical Report, please visit http://standards.sae.org/ARP823F**

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 B928 High Magnesium Aluminum-Alloy Products for Marine Service and Similar Environments

ASTM G34 Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)

ASTM G38 Making and Using C-Ring Stress-Corrosion Test Specimens

ASTM G44 Exposure of Metals and Alloys by Alternate Immersion in Neutral 3.5% Sodium Chloride Solution

ASTM G47 Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

ASTM G64 Classification of Resistance to Stress-Corrosion Cracking of Heat-Treatable Aluminum Alloys (Volume 03.02 of the ASTM 1986 Book of Standards)

2.1.3 NASA Publications

NASA Technical Services, NASA STI Program STI Support Services, Mail Stop 148, NASA Langley Research Center, Hampton, VA 23681-2199, 757-864-9658, Fax: 757-864-6500, http://ntrs.nasa.gov/.

MSFC-SPEC-522A Design Criteria for Controlling Stress Corrosion Cracking, issued 1977 November 18 by George C. Marshall Space Flight Center

MSFC-STD-3029 Guidelines for the Selection of Metallic Materials for Stress-Corrosion Cracking Resistance in Sodium Chloride Environments Materials, Processes, and Manufacturing Department Metallic Materials and Processing Group

2.1.4 U.S. Government Publications

Copies of these documents are available online at https://quicksearch.dla.mil.

MIL-STD-1568 Materials and Processes for Corrosion Prevention and Control in Aerospace Weapons Systems

2.1.5 Other Publications

Metallic Materials Properties Development and Standardization (MMPDS), copyright Battelle Memorial Institute.

NBS Monograph 156, “Stress Corrosion Cracking Control Measures,” by B. F. Brown, Chapter 4 on Aluminum Alloys, 1977 June.

3. GENERAL

Stress-corrosion cracking failures of wrought, high-strength aluminum alloy parts have been attributed to the following combination of factors:

a. Presence of a sustained surface tensile stress developed as a result of assembly stresses and/or residual stresses due to heat treatment, forming, interference fit fasteners, or service stresses acting in a direction perpendicular to the plane of predominant grain flow;

b. Presence of a corrosive environment, which need not be severe (atmospheric water vapor may be sufficient); and

c. Existence of a metallurgical condition which makes the product susceptible to stress-corrosion cracking.