

AEROSPACE STANDARD

SAE

AS7112

Submitted for recognition as an American National Standard

Issued 1997-12

NATIONAL AEROSPACE AND DEFENSE CONTRACTORS ACCREDITATION PROGRAM REQUIREMENTS FOR FLUID SYSTEM COMPONENTS

1. SCOPE:

This Aerospace Standard (AS) establishes the requirements for manufacturers of Fluid System Components to be accredited by the National Aerospace and Defense Contractors Accreditation Program (NADCAP). NADCAP accreditation is granted in accordance with SAE AS7003 after demonstrating compliance with the requirements herein. These requirements may be supplemented by additional requirements specified by NADCAP Fluid System Components Task Group. Using the corresponding Audit Criteria checklists (PR! ACs) will ensure that accredited Fluid System suppliers meet all of the requirements in this standard and all applicable supplementary standards.

The purpose of this audit program is to assess a supplier's ability to consistently provide a product or service that conforms to the technical specifications and customer requirements. The corresponding audit criteria are also structured to obtain information relevant to management practices and processes that directly or indirectly affect the product or service. The information thus obtained will be used for determination of accreditation status, and may be used by the supplier to guide improvements in the product/service or associated processes.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright 1997 Society of Automotive Engineers, Inc.
All rights reserved.

Printed in U.S.A.

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-8510 FAX (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX (412) 776-0790

SAE AS7112

2. REFERENCES:

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS7001	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Description
AS7002	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Rules for Implementation
AS7100/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Nondestructive Testing Requirements
AS7101	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Materials Testing Laboratories Requirements
AS7102	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Heat Treating Requirements
AS7106	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Quality Program Requirements
AS7107	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Inspection System Requirements
AS7108	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Chemical Processing Requirements
AS7109	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Coatings Requirements
AS7110	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Welding Requirements
AS7112/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Hose Manufacturing Requirements
AS7112/2	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Fittings and Other Machined Components
AS7112/3	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Formed Sheet Metal Couplings and Complex Components
AS7112/4	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Requirements for Hose and Tube Assembly

SAE AS7112

2.2 PRI Publications:

Available from Performance Review Institute, 161 Thornhill Road, Warrendale, PA 15086-7527.

AC7100/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Nondestructive Testing Audit Criteria
AC7101/1 thru /9	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Materials Testing Laboratories Audit Criteria
AC7102	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Heat Treating Audit Criteria
AC7106	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Quality Program Audit Criteria
AC7107	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Inspection System Audit Criteria
AC7108	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Chemical Processing Audit Criteria
AC7109	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Coatings Audit Criteria
AC7110	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Welding Audit Criteria
AC7113	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit Criteria for Manufacturers of Fasteners
AC7112/1	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Hose Manufacturing Audit Criteria
AC7112/2	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit Criteria for Fittings and Other Machined Components
AC7112/3	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit Criteria for Formed Sheet Metal Couplings and Complex Components
AC7112/4	National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Audit Criteria for Hose and Tube Assembly
----	NADCAP Fluid System Component Manufacturing Auditor Handbook

SAE AS7112

2.3 Definitions

CP: Chemical Processing

GQS: General Quality Systems

HT: Heat Treating

MTL: Materials Testing Laboratories

NDT: Nondestructive testing

WLD: Welding

3. QUALITY SYSTEM:

- 3.1 The manufacturer's quality system shall be approved, or approval shall be pending or in process to one of the following:

- a. SAE AS7106 (MIL-Q-9858 +)
- b. SAE AS7107 (MIL-I-45208 +)
- c. Other Quality System Approved by NADCAP

4. QUALIFICATION OF PERSONNEL:

- 4.1 Operators and inspectors shall be qualified by at least one of the following:

- a. Training by personnel with documented training procedures
- b. Initial technical examination
- c. Periodic technical examination
- d. Periodic overcheck of work

SAE AS7112

5. CLEANING:

- 5.1 Standard cleaning procedures shall be established for each finished product including:
- a. PTFE hose/hose assemblies (AS611 CL Ø or I)
 - b. Elastomeric hose/hose assemblies
 - c. Metal hose/hose assemblies
 - d. Fittings and couplings
- 5.2 Cleaning procedures shall define the acceptance criteria.
- 5.3 Flush, wash and pressure test media shall be checked regularly for conformance to established cleanliness criteria.
- 5.4 Special cleaning instructions shall be established for oxygen, "super clean" (AS611 CL II or III, etc.) or cleanliness level verification (NAS1638, ISO4406, etc.).
- 5.5 Cleaning procedures shall be established for preparation for joining (weld, braze, mechanical), finish (anodize, plating, painting, etc.) and accessory/variant processing (integral firesleeve, etc.) including:
- a. PTFE hose/hose assemblies
 - b. Elastomeric hose/hose assemblies
 - c. Metal hose/hose assemblies
 - d. Fittings and couplings

6. DEBURRING:

- 6.1 The acceptance criteria for burrs shall be documented.
- 6.2 Equipment with the precision necessary to remove burrs shall be available.
- 6.3 Tool maintenance shall provide for the avoidance of burrs and slivers.
- 6.4 Parts shall be inspected for burrs and slivers.
- 6.5 There shall be documented procedures for removal of burrs and/or slivers.
- 6.6 Deburring shall be accomplished in accordance with customer requirements.

SAE AS7112

7. STATISTICAL PROCESS CONTROL:

- 7.1 If statistical process control methods are required by customer contract, the supplier shall comply with AS7106/7, NADCAP Requirements for Statistical Process Control.
- 7.2 For all processes or specifications, are "Key" Process and Product Characteristics identified and controlled (includes machine tools, hose manufacture, chemical treatments, heat treat, cutting tools, etc.)?
- 7.3 The selection of product/process characteristics to be controlled via SPC methods shall be appropriate.

8. ACCEPTANCE SAMPLING:

- 8.1 Sampling plans used for inspection shall be defined by procurement/contractual requirements or they shall be in accordance with the manufacturer's procedure.
- 8.2 Acceptance sampling shall be in accordance with customer requirements.
- 8.3 Part selection shall be free of bias.
- 8.4 Sample size/frequency shall be sufficient to meet the purchasers stated requirements (AQL, AOQL, or other measure of acceptable product quality).
- 8.5 A description of the sampling plan (or a copy of the plan) shall be available (including a description of part selection method - random, stratified, arbitrary, fixed interval, etc.). Information shall include required AQL, AOQL, LTPD, lot size or frequency, sample size, acceptance number, switching criteria, referenced statistical standard, etc.
- 8.6 Lot Formation:
- 8.6.1 Size of lots shall be appropriate.
- 8.6.2 Lots shall be homogeneous.
- 8.6.3 Part selection shall be free of bias.
- 8.6.4 Sample size/frequency shall be sufficient to meet the purchasers stated requirements (AQL, AOQL, or other measure of acceptable product quality).

SAE AS7112

- 8.6.5 SPC key characteristics shall be identified and controlled in accordance with contractual requirements.
- 8.6.6 All inspection/SPC reports shall be maintained and retained in accordance with procurement/contractual requirements.
9. QUALIFICATION/PERIODIC CONTROL:
- 9.1 Product qualifications shall be conducted in accordance with customer specification requirements.
- 9.2 There shall be evidence of periodic control where required.
10. FROZEN PROCESSES:
- 10.1 Frozen processes shall be properly identified.
- 10.2 There shall be a system in place that assures that applicable customer approval is obtained prior to any Class I change to frozen processes.
11. PROPRIETARY PROCESS/PRODUCT:
- 11.1 There shall be a system in place to notify and review comments from the customer(s) prior to implementing changes in proprietary processes or products.
12. REPRODUCIBILITY & REPEATABILITY:
- 12.1 Gage studies to a nationally recognized method shall be performed on all gaging to determine percent of uncertainty of the gage.