



AEROSPACE STANDARD

AS7200™/1**REV. B**

Issued 1990-07
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Superseded by PRI AC7200/1

National Aerospace and Defense Contractors Accreditation Program (NADCAP)

Audit and Inspection Procedures and Checklists
for the Sealant Manufacturers Accreditation Program

RATIONALE

AS7200/1B is being cancelled and superseded by PRI AC7200/1.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of June 2017 and has been superseded by PRI AC7200/1. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index noting that it is superseded by PRI AC7200/1. Cancelled specifications are available from SAE.

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Documents
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1. SCOPE:

- 1.1 This standard includes the procedures and forms to be used by a third party for auditing and on-going inspection for assessing the capability of sealant manufacturers to furnish products to indicated standards.

2. REFERENCES:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be the issue in effect on the date of the contract.

2.1.1 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
- AS7003 National Aerospace and Defense Contractors Accreditation Program (NADCAP) - Program Operation

2.1.2 Military Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

- FED-STD-368 Quality Control System Requirements
- MIL-STD-1535 Supplier Quality Assurance Program Requirements
- MIL-STD-45662 Calibration Systems Requirements
- MIL-S-8802 Sealing Compound, Temperature-Resistant, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion
- MIL-Q-9858 Quality Program Requirements
- MIL-I-45208 Inspection System Requirements

- 2.1.3 ISO Publications: Available from American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

ISO 9001 Quality Systems - Model for Quality Assurance in Design/Development, Production, Installation, and Servicing
ISO 9002 Quality Systems - Model for Quality Assurance in Production and Installation
ISO 9003 Quality Systems - Model for Quality Assurance in Final Inspection and Test

3. REQUIREMENTS:

- 3.1 The NADCAP program for sealant manufacturers shall consist of the following four parts:

Yearly Accreditation of Quality System
Semi-annual Recheck of Quality System
Batch by Batch Inspection of Quality Conformance Tests
Random Testing at an Independent laboratory to Confirm Suppliers Quality Conformance Tests

- 3.2 The NADCAP program for sealant manufacturers shall use the checklists in the appendices as follows:

Appendix A Summary of Sealant Manufacturer Audit (Yearly Accreditation of Quality System)
Appendix B Continuous Audit Checklist (Semi-annual Recheck of Quality System)
Appendix C Instructions for Audit of Quality Conformance Tests (Batch by Batch Inspection of Quality Conformance Tests)
Appendix D Quality Conformance Tests Checklist (Batch by Batch Inspection of Quality Conformance Tests)

3.3 Discrepancies:

- 3.3.1 Audit findings are reported in writing to the manufacturer at the exit interview and to the NADCAP administrative office in the audit report.

- 3.3.2 Discrepancies in accordance with this document found during ongoing surveillance affecting a particular batch should be handled between the auditor and the manufacturer. An example of this type of discrepancy would be the incorrect reporting of a test value. This may require a change in the test report or retesting. All discrepancies shall be reported to the NADCAP administrative office. If a disagreement between the auditor and the manufacturer persists, the NADCAP administrative office shall contact the designated member(s) of the sealant task group for a decision.

- 3.3.3 Discrepancies found during ongoing surveillance affecting multiple batches shall be reported immediately to the NADCAP administrative office for placement on the information system. If possible, a statement from the manufacturer should accompany the report. An example of this type of discrepancy is a test procedure that has routinely been incorrectly performed. The NADCAP administrative office should notify the designated member(s) of the task group. The task group shall investigate the discrepancy and recommend a course of action.

- 3.3.4 Discrepancies found when spot checking using AS7200/1 shall be reported to the NADCAP administrative office. The NADCAP administrative office shall report the discrepancies to the designated member(s) of the task group for a recommended course of action and possible inclusion on the information system.

4. GLOSSARY:

AREA, RESTRICTED ACCESS - An area delineated by barrier or floor marking which is clearly posted against unauthorized removal of material. Authorization to remove material from a restricted access area can come from the Quality Control department only.

ACCELERATOR - An ingredient used in a sealant formulation to accelerate the rate of cure.

ACCEPTANCE TEST - (also called conformance test) - One of a number of tests called out by a sealant specification to assure the conformance of a particular batch of product to the physical and chemical requirements for the material. May or may not include all the tests listed in the specification. Acceptance tests are usually performed on each batch of material.

ADHESIVE STRENGTH - The strength of the bond between the sealant and the substrate. It is desired that the adhesive bond be stronger than the sealant itself. Thus, if an attempt were made to peel the sealant from the surface, the sealant would pull apart before the bond between substrate and sealant would fail.

APPLICATION TIME - The time available for sealant application following mixing or thawing premixed and frozen sealant. Acceptability limits established for "A" class, brushable sealants are expressed in the time required for the viscosity to increase to a specified level at standard conditions. The acceptability limits for "B" class, extrudable sealants are expressed in terms of the extrusion rate of a sealant at standard conditions.

ASSEMBLY TIME - (also called "work life" or "open time" or "squeeze-out life") - A term used in reference to faying surface sealants. It refers to the amount of time at standard conditions available after mixing or thawing in which work can be done before the overlapping surfaces must be closed, still permitting squeeze-out of the curing sealant.

BASE COMPOUND - The major component of a two-part curing type sealant containing the prepolymer.

BATCH - A mass of base compound or catalyst manufactured at one time. Its identity is maintained by an assigned batch number.

BLOCK FLOW - The distance freshly mixed, uncured sealant will sag while hanging from a vertical surface for approximately one-half hour at standard conditions.

CALIBRATION - The comparison of a standard with a higher ranking reference standard.

CATALYST - The component of a two-part curing type sealant which causes the prepolymer to polymerize.

4. (Continued):

COHESIVE STRENGTH - The strength of internal forces holding a sealant together.

CONFORMANCE TEST - See "Acceptance Test".

CURE RATE - A measure of the rate of polymerization based upon the increasing hardness of the sealant with time. The time required to reach the specified hardness varies widely with the type of sealant and with the temperature and relative humidity. Testing is performed at standard conditions.

CURE TIME - A measure of the time required for the polymerization to advance to a given hardness at standard conditions.

DUROMETER - A mechanical device used to measure the hardness of a sealant. A Shore A or REX A reading is produced. Some materials are measured on a Shore D scale, which encompasses a higher hardness range.

INSPECTION, FINAL - Quality control inspector certification performed after the last in-plant fabrication or assembly operation and prior to preparation for shipment.

INSPECTION, QUALITY CONTROL - A critical comparison of characteristics to standards required by the customer.

JET REFERENCE FLUID (JRF) - A combination of aliphatic and aromatic liquids, also containing mercaptans, used as a harsh environment to test the resistance of integral fuel tank sealants to jet fuels.

KIT - A container or containers in which a one-part or a two-part sealant is packaged. Two-component kits consist of the base compound in one container and the catalyst in the other.

LOT (2-PART MATERIAL) - A quantity of material packaged from a batch of base compound and a batch of catalyst, given a specific identity, and offered for acceptance. This definition also pertains to one-part material except that it is produced from a single batch.

MEGOHMMETER - A device which measures the electrical resistance of a sealant (and other materials as well).

NONCONFORMING MATERIAL - Contract material which has physical, functional and/or dimensional variation or deviation from the applicable specification, or is incomplete.

NONVOLATILE MATTER (NVM) TEST - A test for the percentage of nonvolatile matter in a sealant. Generally, volatile solvents are used to produce the desired amount of flow in brushable and sprayable sealants in particular.

OPEN TIME - See "Assembly Time".

PEEL TEST - Sealant is cured on a selected substrate, then peeled from it using one of several types of testing machines (Scott, Instron, Tinius-Olson). Two factors are of particular importance: the force required to peel it off and the site of the failure. If it is within the sealant, it is called "cohesive failure". If it fails at the bond line, it is called "adhesive failure". The former type of failure is preferred.

4. (Continued):

QUALITY ASSURANCE SYSTEM - The combination of policy, organization, personnel, procedures, inspection and test plans which assure that from receipt of materials to shipment of product, the quality of the product will not be compromised and the performance requirements will be met.

REWORK - The action taken to restore nonconforming materials to an acceptable configuration.

REX "A" HARDNESS - The hardness of a sealant as measured by a REX "A" hardness gauge. It is essentially the same value as Shore "A" hardness.

SEAL KIT - A copyrighted product. See description under "Two Component Plastic Injection Kit".

SEMKIT - A copyrighted product. See description under "Two Component Plastic Injection Kit".

SHORE "A" HARDNESS - The hardness of a sealant as measured by a Shore "A" hardness gauge. It is essentially the same value as Rex "A" hardness.

SOAK TEST - Sealants are soaked in fluids as specified in specifications to determine resistance to these materials. The conditions are somewhat harsher than are found in actual use.

SHEAR TEST - Two narrow strips of aluminum are overlapped at one end by approximately 1 inch and bonded in this area by sealant. After cure, the specimen is mounted in a testing machine and pulled in opposite directions, creating shear forces in the sealant. The force required for the sealant to fail in shear is a measure of its shear strength.

SQUEEZE-OUT TIME - A test performed on faying surface sealants at standard conditions. It is essentially the time from the start of mixing of a two-part kit (or the thawing of a frozen tube of sealant) to the tightening of two surfaces with sealant between them. That period of time which still allows the partially cured sealant to be squeezed out to a preselected thickness between the two surfaces is called the squeeze-out time.

STANDARD CONDITIONS - Standard conditions for preparation of sealant samples and testing are 77 °F ± 2 (25 °C ± 1) and 50% ± 5 relative humidity.

STANDARD, CONTROL - A measuring or controlling device used to provide assurance that allowable process variation has not been exceeded.

STANDARD, REFERENCE - The most accurate company utilized device for assuring the accuracy of control and acceptance standards by periodic comparison.

STANDARD, TRANSFER - A standard device of reference-standard caliber to be used in calibrating control or acceptance standards which cannot readily be brought to the reference standard.

4. (Continued):

TACK FREE TIME - The time required at standard conditions for a curing sealant to lose its surface tackiness as determined by placing a small piece of polyethylene film on its surface and then peeling the film away. The sealant is tack free when no sealant is removed by the film.

TECH KIT - A copyrighted product. See "Two Component Plastic Injection Kit".

TEST REPORT - A report listing physical and chemical properties of a sealant. Test reports are generated for every batch of aerospace sealant manufactured. Generally, the tests are those acceptance tests called for by a given specification.

TRAVELER - Documentation which travels with material in-process, identifying it, indicating the steps of processing necessary, the inspections required, the approvals as initialled by compounders and inspectors. Compounders indicate steps completed. Inspectors confirm quality standards have not been compromised.

TWO COMPONENT PLASTIC INJECTION KIT - A two component plastic injection kit packages the base compound and catalyst of a two-part sealant in separate sections until the time of use. The base compound is contained in a 2-1/2 or 6 fluid ounces polyethylene cartridge, fitted with a plunger at one end and a hollow dasher rod (in which the catalyst is stored) at the other. An agitator is attached to the dasher rod inside the cartridge. The catalyst is mixed with the base compound by inserting a ramrod into the dasher rod, forcing the catalyst into the chamber with the base compound. The dasher rod is then pulled and pushed back and forth with periodic rotation to add to the efficiency of the agitation. When the sealant is mixed thoroughly, the dasher rod is unscrewed from the agitator and removed. A nozzle is screwed onto the cartridge and the unit inserted into a sealant gun for application of the sealant.

VISCOSITY - Viscosity is the property of a fluid relating to shearing stress and continued resistance to flow. The viscosity of sealants is measured at standard conditions by a device which has a spindle mounted on a gauge. A penetrating test device is sometimes used for measuring viscosity.

VISCOMETER - A device which measures viscosity.

WORK LIFE - (See "Assembly Time") - The term is sometimes incorrectly used interchangeably with application time. The term "work life" in MIL-S-8802, a U.S. Government sealant specification, refers to the assembly time or open time of faying surface sealants. Application time, on the other hand, is the time available for application after sealant mixing before the material is too thick to apply by a brush or by extrusion from a sealant gun.

PREPARED BY THE NADCAP COUNCIL

APPENDIX A
SUMMARY OF SEALANT MANUFACTURER AUDIT
(Facility & Quality Assurance System)
(Initial and Reaccreditation Audit)

MANUFACTURER NAME:

ADDRESS:

AUDITOR VISIT DATEREASON FOR VISITPREVIOUS VISIT DATE

AUDIT, Original

AUDIT, Follow-up

AUDIT, Reaccredit

AUDIT RESULTSCIRCLE ONE (or more)AUDIT ELEMENTS

C D P

C D P

C D P

C D P

C D P

C D P

C D P

C D P

C D P

7220 MANUFACTURER OPERATION INFORMATION

7230 QUALITY ASSURANCE SYSTEM

7240 PRODUCT SPECIFICATION & CHANGE CONTROL

7250 PROCUREMENT OF RAW MATERIALS

7260 PRODUCTION SYSTEM

7270 HUMAN SYSTEM (Personnel Qualification)

7280 COMMUNICATIONS

7290 PERFORMANCE

7300 MANUFACTURER SELF-AUDIT

Note: C = Compliance; D = Data from supplier attached; P = Problem - comments attached.

ACTIONS REQUIRED, IF ANY:

Projected completion date of corrective action: _____

Manufacturer acknowledgement: Name: _____

Title: _____

Phone: _____

AUDITOR:

Other Representatives:

Affiliation: _____

Affiliation: _____

Name: _____

Name: _____

Supplier representatives who accompanied auditor on inspection (if other than person acknowledging audit results):

_____AUDITOR COMMENTS: _____

(Attach brief report if necessary)

Audit Date: _____

Date of
last Audit: _____7210 MANUFACTURER IDENTIFICATION

MANUFACTURER NAME: _____

Division/Subsidiary of: _____

MANUFACTURER ADDRESS: _____

Phone: _____

NATURE OF BUSINESS: _____

CURRENT EXPERIENCE AS A MANUFACTURER OF AEROSPACE SEALANTS:

(List current Aerospace companies being supplied, the types of products being supplied, and the specifications to which the products are qualified.)

<u>COMPANY</u>	<u>PRODUCTS</u>	<u>SPECIFICATIONS</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

LIST COMMERCIAL COMPANIES AND GOVERNMENT AGENCIES WHICH HAVE AUDITED THIS FACILITY AND QUALITY ASSURANCE SYSTEM:

<u>COMPANY OR AGENCY</u>	<u>LAST AUDIT DATE</u>	<u>CURRENT STATUS</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

7220 MANUFACTURER OPERATION INFORMATION

A. FACILITY

1. Buildings:

Type: _____

Floor Area (sq. ft.)

Current: _____ Expandable To: _____

2. Plant Capacity for Production, (gal/yr): _____

Current production level: _____

3. Research and Development:
Area (sq. ft.): _____
4. Production Equipment: Describe briefly; Attach list

5. Test Equipment: Describe briefly; Attach list

6. Inspection Equipment: Describe briefly; Attach list

7. Process Control & Quality Control Laboratories: Describe or attach statement.

8. Calibration Capability or Provisions: Describe whether capability is in-house, outside service or combination thereof.

(Attach list of outside companies used and services performed)
9. Environmental Control: Is the facility adequately lighted, ventilated, temperature and humidity controlled (where necessary) for the type of manufacturing, testing or storage involved? Yes No

If no, explain: _____

10. Housekeeping: Does the manufacturer exhibit good housekeeping practices? Yes No

B. ORGANIZATION

Personnel: (Numbers of people in major functions)

Quality Control	_____
Production (Direct Labor only)	_____
Research and Development	_____
All Other	_____
Total	_____

1. Does the current organization chart show the relationship of the Quality Control Department to plant management? Yes No