

National Aerospace and Defense Contractors Accreditation Program
Requirements for Shot Peening, Peen Forming, Glass Bead Peening

RATIONALE

AS7117A is being cancelled and superseded by PRI AC7117. The requirements in the document have not changed.

CANCELLATION NOTICE

This document has been declared "CANCELLED" as of July 2008 and has been superseded by AC7117. By this action, this document will remain listed in the Numerical Section of the Aerospace Standards Index noting that it is superseded by AC7117.

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1. SCOPE:

This Aerospace Standard (AS) establishes the requirements for suppliers of Shot Peening Services to be accredited by the National Aerospace and Defense Contractors Accreditation Program (NADCAP). NADCAP accreditation is granted in accordance with SAE AS7003 after demonstration of compliance with the requirements herein. The requirements may be supplemented by additional requirements specified by the NADCAP Nonconventional Machining and Surface Enhancement (NMSE) Task Group. Using the corresponding Audit Criteria (PRI AC7117) will ensure that accredited Shot Peening 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. This information will be used in the determination of accreditation status and may be used by the supplier to guide improvements in the product or service and the associated processes.

2. REFERENCES:

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15086-0001.

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| 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 (Continued):

- AS9000 Aerospace Basic Quality System Standard
- AS9100 Quality Systems - Aerospace - Model for Quality Assurance in Design, Development, Production, Installation and Servicing
- SAE J442 Test Strip, Holder, and Gage for Shot Peening

2.2 PRI Documents:

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

- AC7004 National Aerospace and Defense Contractors Accreditation Program (NADCAP) – Audit Criteria for Standard Quality Program Requirements
- AC7117 National Aerospace and Defense Contractors Accreditation Program (NADCAP) – Audit Criteria for Shot Peening, Peen Forming, Glass Bead Peening

3. QUALITY SYSTEM:

3.1 The supplier's quality system shall be approved by one of the following:

- a. NADCAP approval to PRI AC7004.
- b. Certification/registration program recognized by NADCAP

4. EQUIPMENT:

4.1 General:

- 4.1.1 The peening equipment shall have the capability of mechanically moving the shot stream and/or the workpiece, if applicable.
- 4.1.2 The physical characteristics of the following shall be checked in accordance with a maintenance plan, as applicable:
 - a. Nozzle and air-jet wear
 - b. Almen fixture wear
 - c. Masking fixtures
 - d. Test sieves
 - e. Part fixtures
 - f. Hoses
 - g. Wheel condition
- 4.1.3 The equipment shall be equipped such that the air and media will not turn on unless the part and nozzle/wheel motions are also turned on, if applicable.
- 4.1.4 All process monitoring equipment and/or gages shall be identified as to their calibration status, and the calibration shall be current.
- 4.1.5 The gages used to monitor/control the process shall have a measurement range to cover the operating range of the equipment, and the gage resolution shall be sufficient.

- 4.1.6 The equipment shall be equipped with instrumentation or visual indicators that allow the operator to monitor the following, as applicable:
- a. Air pressure or wheel speed
 - b. Part movement
 - c. Nozzle/wheel movement
- 4.1.7 The equipment shall be equipped with media quality control equipment to maintain size and shape of the media per the specification requirements.
- 4.1.8 The shot peening equipment shall include a dust collector for continuous removal of dust and other fine particles during operation.
- 4.1.9 An air management system shall be in place that provides filtered, dry air to pneumatic peening equipment, as applicable.
- 4.1.10 The air system shall include low-air pressure alarms or shall be addressed in an air capacity management plan, as applicable.
- 4.1.11 When fluorescent tracer is used, black light intensity shall be verified in accordance with customer requirements.
- 4.2 Computer Peening Only:
- 4.2.1 Equipment shall be qualified in accordance with customer requirements, if applicable.
- 4.2.2 The equipment shall be equipped with a continuous monitoring capability for each of the required process parameters.
- 4.2.3 The equipment shall be equipped with the capability to shut down the process when required parameter limits are exceeded.
- 4.2.4 A record of shut down details shall be generated for each occurrence of automatic shut down.
- 4.2.5 Shot screening equipment shall be integral to the shot peening media reclaim system so that the media is classified continuously.
- 4.2.6 Software Quality Assurance:
- Software quality assurance procedures shall meet customer requirements, if applicable.
- 4.2.6.1 Procedures shall be established to control the software (including firmware) used in the automated design, inspection, test or manufacture of products.
- 4.2.6.2 The personnel responsible for ensuring compliance with the software quality program requirements shall have the resources, authority, and organizational freedom to permit objective evaluations and to initiate and verify corrective actions.

- 4.2.6.3 There shall be a document system to address software-related problems and nonconformances.
- 4.2.6.4 Software records shall be maintained and software backups shall be secured in a remote location for disaster recovery in accordance with customer(s) data retention requirements.
- 4.2.6.5 The organization developing the software shall have a documented system to ensure the software is developed and documented in a consistent, understandable, and maintainable manner.
- 4.2.6.6 Software shall be uniquely identified in the appropriate work instructions.
- 4.2.6.7 Program changes shall be documented and a revision history shall be maintained.
- 4.2.6.8 A documented system shall be in place that protects the software from unauthorized changes.
- 4.2.6.9 A procedure shall be in place that prevents access to obsolete software.
- 4.3 Flapper Peening Only:
 - 4.3.1 Flapper peening equipment shall be capable of maintaining the required RPM and consistently reproduce intensity values.
- 5. ALMEN:
 - 5.1 Almen Gages:
 - 5.1.1 Almen gages shall meet the requirements of SAE J442 and/or customer requirements for precision and geometry.
 - 5.1.2 Almen gages shall read to the nearest 0.0025mm (0.0001 inch) or finer, if applicable.
 - 5.1.3 Almen gages shall have a digital readout, if applicable.
 - 5.1.4 The calibration procedure shall calibrate the indicator and check the Almen gage locating balls and indicator tip for wear in accordance with SAE J442 and/or customer requirements.
 - 5.2 Almen Fixtures:
 - 5.2.1 Almen strip holders shall be procured in accordance with the requirements of SAE J442 and/or customer requirements.
 - 5.2.2 Almen fixtures shall be identified with permanent marking.
 - 5.2.3 Almen fixtures shall be stored in a manner to prevent mechanical damage and corrosion.
 - 5.2.4 Almen strip holder platforms of each Almen fixture shall be protected from damage during peening.

5.2.5 The appropriate magnetic Almen strip holder shall be used for flapper peening.

5.3 Almen Strips:

5.3.1 Almen strips shall meet the requirements of SAE J442 and/or special customer requirements.

5.3.2 Almen strips shall be flat within customer requirements prior to use.

6. MEDIA:

6.1 Testing:

6.1.1 Equipment shall be available for visually examining media shape and weighing media sieve samples.

6.1.2 Sieves shall be available for the required testing of each size and type of media used.

6.1.3 The shaking and tapping machine used for sieve testing shall be in satisfactory condition and properly used, if applicable.

6.2 New:

6.2.1 Shot peening media (cast, cut wire, ceramic, glass beads) shall be certified and shall meet the required specifications.

6.2.2 New cast steel media shall be conditioned prior to use on parts.

6.2.3 Rotary peening flaps shall meet the appropriate specification.

6.3 New and In-Use

6.3.1 Media of different sizes, types, and hardness shall be stored to keep them separated, uncontaminated, and dry.

6.4 In-Use

6.4.1 Sieve analysis shall be performed and recorded on peening media in machines at the required intervals of run time.

6.4.2 Media shape shall be inspected with the specified method and recorded at the required intervals of run time.

6.4.3 For flapper peening, rotary peening flaps shall be replaced at or before 20% of balls are lost.

7. PERSONNEL:

7.1 Training / Evaluation

- 7.1.1 A training program shall be in place for all operators and inspectors per the applicable specifications and customer requirements.
- 7.1.2 If manually controlled peening is allowed, the operators shall be approved in accordance with specification requirements.
- 7.1.3 If flapper peening is allowed, the operators shall be approved in accordance with specification requirements.
- 7.1.4 There shall be a written test administered to determine qualification, if required by specification.
- 7.1.5 The pass/fail criteria and re-testing procedure shall be identified.
- 7.1.6 The operators/inspectors shall be re-qualified at specified intervals.
- 7.1.7 Personnel training/certification/qualification records shall be documented and maintained.
- 7.1.8 The training and evaluation program of operators and/or inspectors shall require the demonstration of proficiency in the following:
 - a. Determining masking requirements from process sheets and applying it to hardware
 - b. Shot size by sieve analysis
 - c. Shot fracture count
 - d. Nozzle/wheel positioning and nozzle selection
 - e. Equipment and fixture usage
 - f. The use of an Almen gage and Almen strip
 - g. The use of Almen strip fixtures
 - h. Calculating the resultant arc height (if pre-bow compensation method is used)
 - i. Understanding and creating saturation curves
 - j. The making of a coverage map
 - k. The application and inspection with fluorescent tracer
 - l. Determination of applicable peening time
 - m. Demonstrating the ability to inspect a part for coverage using magnification and other inspection aids
- 7.1.9 For computer peening, the qualified operator shall be capable of identifying shut down causes.
- 7.1.10 For computer peening, the operator shall know the procedure for handling a shut down while processing a part.
- 7.1.11 For computer peening, the qualified operator and/or inspector shall demonstrate proficiency in equipment setting and shut down limit setting.