



AEROSPACE STANDARD

AS6414™**REV. A**Issued 2016-08
Revised 2017-06

Superseding AS6414

Manufacturing Processing Requirements for Molded Elastomer Components Used in Aerospace Applications

RATIONALE

This revision changes the CERTIFICATE OF CONFORMANCE requirement to CERTIFICATE OF ANALYSIS, clarifies blended batch requirements and updates references.

1. SCOPE

1.1 Application

This specification is applicable to the processes that are used in the manufacture of aerospace elastomer parts utilizing materials conforming to AMS7XXX series specifications, user specifications, or print on a Purchase Order (PO) that calls out this document for aerospace applications. The elastomer parts are in the form of O-rings, plate seals and other compression seals.

1.2 Safety-Hazardous Materials

While the use of materials, applications and processes described or referenced in this specification may involve hazardous materials, this specification does not address the hazards involved in their use. It is the responsibility of the manufacturer to provide the purchaser with the safe and proper use of materials and processes and to take necessary precautionary measures and training of personnel to ensure the health and safety of all personnel involved. However, it is not addressed in this document.

1.3 Order of Precedence

This specification is in addition to and in no way limiting, superseding, or abrogating any contractual obligation as required by the applicable procurement document. In the event of conflict in requirements, the order of precedence shall be:

1. Procurement Document or Contractual Agreement (excluding this document)
2. Applicable purchaser's drawing
3. Specifications referenced on the drawing
4. This document
5. All specifications referenced in this document

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Documents

Document Sharing Hub

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.

AMS2750	Pyrometry
AMS2817	Packaging and Identification, Preformed Packings
ARP5316	Storage of Elastomer Seals and Seal Assemblies Which Include an Elastomer Element Prior to Hardware Assembly
AS568	Aerospace Size Standard for O-Rings
AS5752	Aerospace - Visual Inspection Standard for Elastomeric Sealing Elements Other than O-Rings
AS9100	Quality Management Systems - Requirements for Aviation, Space and Defense Organizations

2.1.2 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.1.3 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 D1414	Standard Test Methods for Rubber O-Rings
ASTM D2240	Standard Test Method for Rubber Property-Durometer Hardness
ASTM D7969	Standard Specification for Gravity Convection and Forced Ventilation Ovens
ASTM E145	Standard Specification for Gravity-Convection and Forced-Ventilation Ovens

2.1.4 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 3601-1	Fluid Power Systems – O-Rings – Part 1: Inside diameter, cross sections, tolerances and size identification codes
ISO 3601-3	Fluid Power Systems – O-Rings – Part 3: Quality Acceptance Criteria
ISO 9001	Quality management systems — Requirements
ISO 17025	General requirements for the competence of testing and calibration laboratories
ISO 27996	Aerospace Fluid Systems – Elastomer Seals – Storage and Shelf Life

2.1.5 PRI Publications

Available from Performance Review Institute, 161 Thorn Hill Road, Warrendale, PA 15086-7527, Tel: 724-772-1616, www.pri-network.org.

AC7115	Nadcap Audit Criteria for Manufacture of Elastomer Seals
AC7122-P	Nadcap Audit Criteria for Non Metallic Materials - Testing Laboratories P - Part Manufacturers Captive Laboratories
AC7122/1	Nadcap Audit Criteria for Non Metallic Materials - Testing Laboratories - Mechanical Testing
AC7122/2	Nadcap Audit Criteria for Non Metallic Materials - Testing Laboratories - Physical Testing
AC7122/3	Nadcap Audit Criteria for Non Metallic Materials - Testing Laboratories - Chemical Testing
AC7122/4	Nadcap Audit Criteria for Non Metallic Materials - Testing Laboratories - Thermal Analysis
PD2102	Aerospace Quality Assurance Product Standards, Qualification Procedure, Elastomeric Seal

2.2 Definitions

BATCH: The quantity of a compound run through a mill or mixer at one time. Mixing of batches of previously compounded material restricted to the requirements of this document.

BATCH TESTING (BATCH ACCEPTANCE TESTING or BATCH CONFORMANCE TESTING): Material property testing on a batch of compound through identified industry test methods and utilizing the same operating parameters of time, temperature, and pressure that lead to the same state of cure as the test specimens used to generate qualification data. The batch testing or acceptance tests and methods are identified within the applicable specification. In the event no specimen type or test method is identified then durometer (ASTM D2240, Type A), tensile and elongation (ASTM D1414), and specific gravity (ASTM D1414) shall be utilized.

BLENDED: The combination of the same formulation of multiple batches of uncured, conforming material to create a new batch of material of the same formulation.

CAPTIVE COMPOUNDER: A rubber mixing operation owned by or otherwise integrated into the same organization or management structure as the manufacturer.

CAPTIVE LABORATORY: A rubber testing laboratory owned by or otherwise integrated into the same organization or management structure as the manufacturer.

CERTIFICATE OF ANALYSIS (CofA): A document that displays the requirements and results with a statement of conformance for the compounded material or a finished part.

CHEMICAL MANUFACTURER: A company that produces compounding ingredients.

COMPOUND: A general term used to describe a particular formula/formulation that is mixed, uncured rubber material.

COMPOUNDER: A company that combines raw materials into the form of an uncured product (can be the same as the manufacturer).

COMPOUNDING INGREDIENT*: Any material incorporated with an elastomer to form a compound or mix.

DEFLASHING: The removal excess rubber at the parting line on molded rubber parts.

EXTERNAL COMPOUNDER: An independent rubber mixing operation that is not owned by the manufacturer or otherwise integrated into the manufacturer's organization or management structure.

FORMULA/FORMULATION: A list containing the identity of the ingredients to be included in a compound.

INITIAL QUALIFICATION (QPL): Refer to the PD2102 document for the amount of testing required where a full specification testing is based on one batch of data and a second set of verification data is also required.

LOT: A quantity of one size of product processed as one entity from a single batch.

LOT TESTING: Testing on lot samples with the specimen type and test methods as identified within the applicable specification.

MANUFACTURER: A company that receives an uncured rubber compound and produces finished product (can be the same as the compounder).

MASTER BATCH: The first pass of a multiple pass mix that does not include curatives. This is not tested.

PROCEDURE: An established, documented, implemented and maintained way to carry out an activity or a process.

PROCESS: Any activity or set of activities that uses resources to transform inputs into outputs.

PURCHASER: A company that procures product directly from a particular specification.

RECIPE: Based on the formula/formulation wherein the concentration of each ingredient to be present is specified with tolerances.

REQUALIFICATION (QPL): Refer to the PD2102 for the amount of testing required.

REWORK: The act of reprocessing noncomplying, in-process materials or finished parts, through the use of original or equivalent processing, in a manner that assures full compliance of the final part with applicable drawings or specifications.

SUBCONTRACTOR: A company that is hired to perform any function requested by a compounder or manufacturer.

WORK INSTRUCTION: A detailed document outlining tasks within a procedure.

WORK ORDER: A document that provides all processing conditions for a specific part that accompanies the part through the manufacture process which should include at a minimum reference to the part or drawing being manufactured, the quantity of material being produced, material identification, material lot identification, material cure date, and reference to the manufacturing process.

(*Definitions taken from Fundamentals of Rubber Technology)

3. COMPOUNDER REQUIREMENTS

3.1 Compounder

3.1.1 If an external compounder is used, they shall be approved by the manufacturer based upon:

1. Being currently registered to ISO 9001, or