



AEROSPACE STANDARD	AS5316™	
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Storage of Elastomer Seals and Seal Assemblies Which Include an Elastomer Element Prior to Hardware Assembly

RATIONALE

There has been an aerospace industry need to convert ARP5316 to an Aerospace Standard because the current document has been used as a standard even though it is a Recommended Practice. This document satisfies this need.

FOREWORD

Listed below is the background information which led to the creation of this Aerospace Standard.

1. Introduction of MIL-STD-1523

Age control was imposed on elastomers used in critical sealing devices of aircraft hydraulic, lubricating, and fuel systems after World War II. Several different requirements and specifications were implemented in the years following the war until 1958 when ANA Bulletin 438 was released. This bulletin's purpose was to collect all previous requirements for age control in one document and to make it easier for various agencies and contractors to effectively implement age control. However, confusion in interpretations resulted in abuses, cost increases and inconsistently imposed exceptions.

Many other programs were then undertaken to study age control. The results of many of these were summarized in the Air Force report, AFML-TR-67-235. The conclusion of the studies summarized in this report and others that were in progress was that the overall properties of elastomeric materials were much improved over the materials initially evaluated and age control should be made less restrictive. As a result of this information, MIL-STD-1523 was released in 1973 and superseded ANA Bulletin 438. One of the basic requirements of the new document was to provide a cure date limitation of 12 quarters from cure date to acceptance of the seals by the original procuring activity, whether a government agency, a first or second contractor or an organization which assembles seal and hardware kits. In all cases, the use of cure date was intended to provide for good FIFO (First In - First Out) warehousing procedures.

On February 1, 1984, MIL-STD-1523A was issued to supersede MIL-STD-1523. This revision was targeted at eliminating the confusion in interpretation of the previous document. It also extended cure date requirements from 12 quarters to 40 quarters. MIL-STD-1523A controlled the age of elastomers only at time of acceptance by the government. This meant that the cure date of each elastomer had to be known at the time a system was accepted by the government.

Even with the clarifications of MIL-STD-1523A, confusion still existed and the discussion regarding the need for age control continued.

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2. Introduction of EPRI NP-6608

In June, 1989, Bruce Boyum and Jerral Rhoads presented an IEEE Paper: "Elastomer Shelf Life: Aged Junk or Jewels" - IEEE Transactions on Energy Conversion, Vol. 4, No. 2, pp. 191-203, June, 1989. After a detailed review of the information from previous studies and the age control documents including MIL-HDBK-695C, they concluded that age control limits were very conservative and shelf life could be extended as long as proper storage conditions were maintained.

This was followed up in May, 1994 by EPRI NP-6608, "Shelf Life of Elastomeric Components". The conclusion of this detailed study was that with proper storage, shelf life for elastomer seals could be extended to 32 years.

3. Introduction of AS1933A

Based upon the data from the numerous studies concerning age control and shelf life, MIL-STD-1523A was canceled on January 30, 1995 - without replacement but reference was made to AS1933A. This action, in essence, released aerospace elastomers from age control.

In the time since the cancellation of MIL-STD-1523A confusion has reigned. Contractors are not aware of the history of age control and still insist on it. Quality organizations are not only still insisting on age control but are now using AS1933A for seals or referring to MIL-HDBK-695C.

Some of the insistence for age control is due to the requirement that the latest revision of specifications shall be used and if age control or cure date requirements are removed, there is no traceability to specification revisions. In addition, organizations are concerned about FIFO requirements being maintained.

4. Introduction of ARP5316

To address the needs of contractors and to alleviate the confusion created by the cancellation of MIL-STD-1523A, ARP5316 was issued. This recommended practice addressed elastomeric seal components and offered a control document for those organizations which required one. It included recommended shelf life limits that were consistent with the data from the cumulative studies on age control. It addressed the need for traceability and proper storage of elastomeric components of seals. It also provided a document that addressed seals not hoses, rubber boots, etc. It provided a reference source for Quality Organizations to work with. Since it was so widely used and referenced, it is now an Aerospace Standard.

The specified storage times are based upon industry input regarding practical storage limits based upon FIFO requirements. Most users of the elastomers addressed in AS5316 will find that the times listed in the document are beyond the time periods utilized in FIFO programs. More importantly, proper storage and traceability are specified since these are the key elements in promoting long shelf life and ensuring that the elastomeric seal components meet the latest revision of a specification.

5. Introduction of MIL-HDBK-695

This document directs the reader to ARP5316 for questions concerning elastomer seal shelf life.

6. Introduction of DoD Manual 4140.27, Volumes 1 and 2

AS5316 is the key elastomer seal shelf life reference for complying with the shelf life extension policy requirements of the DoD Shelf-Life Management Program Manual, Volumes 1 and 2. Paragraph 4.3 of Volume 1 specifies remaining shelf-life requirements for shelf-life items or materiel which includes elastomer seals.

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1. SCOPE

This SAE Aerospace Standard (AS) specifies the general requirements for data recording procedures, packaging, and storing of elastomeric seals and seal assemblies which include an elastomeric element prior to the seal being assembled into hardware components.

NOTE: The requirement for packaging is an integral part of the controlled storage procedure and provides a means of positive product identity from the time of manufacture to the time of assembly into a component.

1.1 Disclaimer

As AS5316 deals solely with the life of elastomeric parts when they are being stored, this document shall not be used to justify the service life of any elastomeric component after it has been installed in any assembly, sub-assembly or any other hardware

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.

AMS2817 Packaging and Identification, Preformed Packings

AS1933 Age Controls for Hose Containing Age-Sensitive Elastomeric Material

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 D1418 Standard Practice for Rubber and Rubber Latices - Nomenclature

2.1.3 Electric Power Research Institute Publications

Available from EPRI, 3420 Hillview Avenue, Palo Alto, CA 94304, www.epri.com.

NP-6608 Shelf Life of Elastomeric Components