SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

SAE AS1933 | REV. A

Issued 1985-02
Revised 1998-11
Reaffirmed 2013-01

Superseding AS1933

Age Controls for Hose Containing Age-Sensitive Elastomeric Material

RATIONALE

AS1933A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Purpose:

This document establishes age limit and guidance for acceptance of hose and hose assemblies containing elastomeric materials for use in aircraft, space vehicles, missiles and component assemblies thereof at time of delivery to the contractor, procuring activity, or contracting officer. This document does not establish limitations on storage times for military/civil activities nor operating life.

2. REFERENCE DOCUMENTS:

2.1 Applicable Documents:

The following publications form a part of this specification to the extent specified herein. The applicable issue of other publications shall be the issue in effect on the date of purchase order. In the event of conflict between the text of this specification and references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption is obtained.

2.1.1 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-129 Marking for Shipment and Storage
MIL-HDBK-695 Rubber Products: Recommended Shelf Life

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2.2 Definitions:

2.2.1 AGE-CONTROL: "Age-control" is the designation of a specific maximum period of age after cure-date that will assure desired conformance characteristics of an elastomeric material. Age control is based on the premise that elastomers deteriorate upon exposure to ozone, oxygen, heat, sunlight, rain, and other similar environmental factors. (See 4.1)

2.2.1.1 Age controlled by this standard (was MIL-STD-1523) is age to acceptance by the user.

a. Shelf (storage) life is that period from acceptance that the "user" typically stores hose or a hose assembly(ies) prior to installation into service. MIL-HDBK-695 or similar document typically controls this period. It is not measured from cure date. (See 4.2)
b. Service Life is that period after installation that has been determined by the "user" based on a particular installation/use environment. It is measured from installation not cure date.

2.2.2 AGE SENSITIVE: "Age sensitive" is that characteristic of an elastomer which makes it subject to deterioration by oxygen, ozone, sunlight, heat, rain, and similar factors experienced in the normal environmental exposure subsequent to vulcanization.

2.2.3 ELASTOMER: A material which possesses elastic properties similar to those of natural rubber in the vulcanized state. At room temperature an elastomer can be stretched repeatedly to at least twice its original length and will, upon release of stress, return to its approximate original length.

2.2.4 RUBBER: A material that is capable of recovering from large deformations quickly and forcibly in the vulcanized state. Originally applicable to a natural substance taken in liquid form from trees, the term now includes synthetic rubber of many types and is synonymous with elastomer.

2.2.5 VULCANIZATION: A complex reaction wherein the polymeric elastomer combines with additives, usually at an elevated temperature, to effect a change in state from an easily formed plasticity to a form with characteristic resilience and strength. The process is also referred to as curing or cross-linking.

2.2.6 CURE-DATE: "Cure-date" is the date the compounded, uncured elastomer is vulcanized to produce an elastomeric product. Also referred to as "manufacture date".

2.2.7 ACCEPTANCE: Acceptance is the act of an authorized representative of the user by which the purchaser assumes for itself, or as the agent of another, ownership of existing and identified supplies tendered, or approves specific services rendered, as partial or complete performance of the contract on the part of the contractor.

2.2.8 HOSE: A flexible conduit of circular cross section, usually consisting of an inner tube, reinforcement, and an outer cover. The inner tube and outer cover, if used, as well as intermediate layers may be of elastomeric materials subject to age sensitivity.

2.2.9 BULK HOSE: Hose without couplings or fittings.

2.2.10 HOSE ASSEMBLY: A length of hose with a coupling attached to one or each end.

2.2.11 HOSE ASSEMBLY DATE: The date the hose end fittings are applied to the hose to form a hose assembly.

2.2.12 UNINSTALLED: Hose assemblies offered for acceptance against procurement contracts.

2.2.13 INSTALLED: Hose assemblies joined to other parts to form assemblies or components offered for acceptance against procurement contracts.

2.2.14 CONTRACTOR: A contractor is an individual, partnership, company, corporation, or association having a contract with a procuring activity for the design, development, design and manufacture, manufacture, maintenance, modification or supply of items under the terms of the contract.

2.2.15 PROCURING ACTIVITY: A procuring activity is an organization or agency within or acting for the user including prime or lower tier contractors.

2.2.16 CONTRACTING OFFICER: The contracting officer is a legally responsible individual acting for a procurement activity.

2.2.17 TIME OF DELIVERY: "Time of delivery" is defined as the date of acceptance by the procurement activity. Date of acceptance is to be clearly defined by contract or negotiated agreement.

2.2.18 ACCEPTANCE DATE: The acceptance date is the specific date (day, month, and year) that the acceptance as defined in 2.2.7 occurs. Shelf life per MIL-HDBK-695 or other purchaser guidance begins at this date.

3. REQUIREMENTS:

3.1 Usage:

This standard shall be applicable to contractors supplying elastomeric hose/hose assemblies for vehicles, aircraft and missiles, aircraft and missile engines, and aircraft and missile components to the user, and to subcontractors of and vendors to such contractors. Procurement activities will use the age limitations and marking requirements established herein when initiating procurement documents. This document may also be cited for nonaerospace product.

3.2 Age Limitations:

The age limit at acceptance by the user procuring activity is 32 quarters. See Figure 1, Note 5.1 for additional guidelines. Hose/hose assemblies whose age cannot be determined shall be rejected.

3.3 Cure and Assembly Date Marking:

The cure date shall be marked on the hose in accordance with the provisions of the hose specification. Cure-date and assembly date shall be indicated by quarter of year and year. The year shall be divided into quarters as follows:

1st Quarter	January, February, March
2nd Quarter	April, May, June
3rd Quarter	July, August, September
4th Quarter	October, November, December

Hose and hose assemblies manufactured or assembled during any given quarter will not be considered one quarter old until the end of the succeeding quarter.

3.3.1 Examples: A product cured during January, February, or March of any year will not be considered one quarter old until July 1 of that same year. A product cured during October, November, or December of any year will not be considered one quarter old until April 1 of the following year.

3.3.2 Acceptance: Age control shall be based on the cure-date. Cure-date shall be marked on containers in accordance with MIL-STD-129 or equivalent, indicating the applicable quarter of year digit, the letter "Q", and terminated with the last two digits of the applicable year. Hose cured in June of 1982 would be cure-date marked "2 Q 82".

3.3.3 The age of a hose assembly shall be identified by the assembly date. Assembly-date shall be physically marked on the assembly. The marking shall consist of the letter "A" followed by the quarter of year digit, the letter "Q", and terminated with the last two digits of the applicable year. Hose assemblies fabricated in June, 1982 shall be assembly-date marked "A 2 Q 82". When a decal is used which states "assembly-date", the "A" may be omitted. Unambiguous month, year or day, month, year identification may also be used in lieu of quarter dating.

4. STORAGE:

4.1 Conditions:

Hose and hose assemblies that contain age-sensitive elastomeric materials shall be protected from circulating air, sunlight, fuel, oil, water, dust, and ozone (which is generated by electric arcs, fluorescent lamps and similar electrical equipment). The storage temperature shall not exceed 125 °F.

4.2 Hose assemblies should not be fabricated for extended storage. Elastomers may take a compression set. If the assembly date of an unfilled, stored assembly is more than one quarter prior to installation or periodic pressure test, the I.D. should be filled with system fluid for 24 hours prior to any pressurization. Pressure test(s) after initial assembly proof should be at rated operating pressure.