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SCALE CONDITIONER, ALKALINE  
Aircraft Turbine Engine Components

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

1.1 Form:

This specification covers a strongly alkaline scale conditioner in the form of a liquid or a water-soluble powder.

1.2 Application:

This product has been used typically in conditioning heat scale formed on aircraft turbine engine high-temperature alloy parts by immersion in a solution of the compound at elevated temperature, but usage is not limited to such applications. These compounds are unsuitable for cleaning aluminum parts.

1.3 Classification:

Compounds conforming to this specification are classified as follows:

- Type 1 - Water-soluble powder
- Type 2 - Liquid concentrate

1.3.1 Type 1 shall be supplied unless Type 2 is ordered.

1.4 Precautions:

Scale conditioner may contain chemicals which, if improperly used, could be hazardous to the health and safety of operators. Protective clothing including eye shields, suitable gloves, and apron should be worn when preparing and using scale conditioner. Tanks shall be prepared and operated under conditions of adequate fume extraction and with due regard to the safety recommendations of the manufacturer of the compound together with local workshop safety regulations.

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### 1.5 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

### 2. 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 publications shall be the issue in effect on the date of the purchase order.

#### 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2825 Material Safety Data Sheets

ARP1755 Effect of Cleaning Agents on Aircraft Engine Materials, Stock Loss Test Method

#### 2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 1568 Sampling and Chemical Analysis of Alkylbenzene Sulfonates

ASTM D 2667 Biodegradability of Alkylbenzene Sulfonates

#### 2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

ML-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

### 3. TECHNICAL REQUIREMENTS:

#### 3.1 Composition:

The composition of the conditioner shall be optional with the manufacturer except that, when prepared for use, the solution shall form a strongly alkaline liquid product. When prepared in accordance with manufacturer's instructions, the solution shall contain no solid sediment at room temperature and shall meet the requirements of 3.2. The solution make up and control shall be in accordance with manufacturer's instructions and purchaser's requirements.

### 3.2 Properties:

The scale conditioner shall meet the following requirements; tests shall be performed in accordance with specified test methods on the product supplied at the maximum concentration and temperature recommended by the manufacturer.

- 3.2.1 Stock Loss:** Test panels of alloys or electrodeposits shall not incur stock loss exceeding 0.00025 inch (0.635  $\mu\text{m}$ ) per surface and plasma deposited coatings shall not incur stock loss exceeding 0.0001 inch (2.5  $\mu\text{m}$ ), when tested in accordance with ARP1755, Category 3. Stock loss figures shall be reported for all materials specified in ARP1755, Category 3. Vendor shall indicate where compound is not recommended for particular alloys or coatings.
- 3.2.2 Surface Attack:** Test panels and bars used for the stock loss test of 3.2.1 shall neither exhibit pitting corrosion nor show visual evidence of degradation, when examined at 50X magnification under good oblique surface lighting conditions.
- 3.2.3 Biodegradability:** Vendor shall supply evidence that surfactants used in the scale conditioner are at least 90% biodegradable, determined either in accordance with ASTM D 2667 where relevant to surfactant type or by alternative methods appropriate to surfactant type acceptable to purchaser.
- 3.2.3.1 Evidence of surfactant biodegradability does not guarantee that the conditioner or solution may be discharged in either concentrated or diluted form into public waterways or sewerage systems; manufacturers shall give advice on the means for disposal.**
- 3.2.4 Storage Stability:** Conditioner stored at 25 °C  $\pm$  5 (77 °F  $\pm$  9) for one year from date of receipt by purchaser shall show no visual evidence of deterioration and shall meet all other technical requirements of this specification.
- 3.2.5 Performance:** Conditioner, prepared and used in accordance with (R) manufacturer's instructions, shall condition heat scale on parts to make the scale readily removable. Conditioner, which meets all other technical requirements of this specification shall be service tested in an approved engine overhaul facility for not less than six months, during which time at least ten turbofan or turbojet engines, or equivalent, shall be processed with satisfactory results before approval for service use is granted by the applicable engine manufacturer.

### 3.3 Quality:

The conditioner, as received by purchaser, shall be homogeneous and free from solid particles, separation, and any foreign material detrimental to usage of the conditioner. If conditioner is supplied in powder form it shall be free flowing, free from lumping caused by moisture absorption, and free from foreign materials detrimental to its usage.

**4. QUALITY ASSURANCE PROVISIONS:****4.1 Responsibility for Inspection:****(R)**

The vendor of conditioner shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the conditioner conforms to the requirements of this specification.

**4.2 Classification of Tests:****(R)**

Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of conditioner to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

**4.2.1** For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

**4.3 Sampling and Testing:****(R)**

Sufficient conditioner shall be selected in accordance with ASTM D 1568 or other procedure specified by purchaser. A lot shall be all compound produced in a single production run from the same batches of raw materials under the same fixed conditions and presented for vendor's inspection at one time. An inspection lot shall not exceed 6,000 gallons (22,712 L) if a liquid or 10,000 pounds (4536 kg) if a powder.

**4.4 Approval:**

**4.4.1** Sample conditioner shall be approved by purchaser before conditioner for production use is supplied, unless such approval be waived by purchaser. Results of tests on production conditioner shall be essentially equivalent to those on the approved sample.

**4.4.1.1** A new or revised conditioner may be conditionally approved pending completion of the storage stability test of 3.2.4. Full approval will be granted following testing for the other technical requirements after completion of storage stability testing.

**4.4.2** Vendor shall use ingredients, manufacturing procedures and processes, and methods of inspection on production conditioner which are essentially the same as those used on the approved sample conditioner. If necessary to make any change in ingredients or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample conditioner. Production conditioner made by the revised procedure shall not be shipped prior to receipt of reapproval.