



AEROSPACE MATERIAL SPECIFICATION	AMS2549™	
	Issued	2024-10
Electrical Discharge Machining		

RATIONALE

AMS2549 is a new specification to cover electrical discharge machining.

NOTICE

ORDERING INFORMATION: The following information shall be provided to the processor by the purchaser.

1. Purchase order shall specify not less than the following:

- AMS2549
 - Quantity of pieces to be machined
 - Classification (see 1.3)
 - If specimens are allowed for periodic testing (see 4.2.2 and 4.3.3)
2. Parts manufacturing operations such as heat treating, forming, joining, and media finishing can affect the condition of the substrate for electrical discharge machining (EDM) or, if performed after EDM, could adversely affect the processed part. The sequencing of these types of operations should be specified by the cognizant engineering organization (CEO) and is not controlled by this specification.

1. SCOPE

1.1 Purpose

This specification provides processing and acceptance requirements for electrical discharge machining (EDM) when applied to the manufacturing of parts.

1.2 Application

This specification is applicable to all cutting, forming, and/or drilling processes carried out by EDM of aerospace components. This specification is applicable to the following EDM methods:

- Sinkers or ram EDM
- Fast hole EDM drilling
- Wire EDM

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Full document details: SAE AMS2549

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS2549/>

Documents

Standard Sharing Hub

1.3 The EDM process introduces defects into the surface of the part being machined. As a result, the EDM process should be controlled, and parts should be tested for any such effects.

1.4 Classification

Class 1 - Flight-critical or rotational parts.

Class 2 - Non-flight critical or non-rotational parts.

Class 3 - Parts that have all aspects of the EDM removed by conventional machining (see 3.2.3).

1.4.1 If no classification is specified, Class 2 shall apply.

1.4.2 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 that 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 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.

AS2390 Chemical Process Test Specimen Material

AS7766 Terms Used in Aerospace Metals Specifications

2.2 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 E3 Preparation of Metallographic Specimens

2.3 Definitions

Terms used in AMS are defined in AS7766 and as follows:

2.3.1 ADEQUATE LIGHTING

Shall be uniform with white light intensity greater than 1000 lux or greater than 93 foot candles at the part. No shadows or bright spots shall be present on the parts during inspection.

2.3.2 DIELECTRIC FLUID

A dielectric fluid is a non-conducting fluid that is an insulator and has the following important functions:

- Acts as a medium between the electrode and the work piece through which controlled electrical discharges occur.
- Acts as a quenching medium to cool and solidify the gaseous EDM debris resulting from the discharge.
- Acts as a medium used to carry away the solidified EDM debris from the discharge gap to the filter system.
- Acts as a heat transfer medium to absorb and carry away the heat generated by the discharges from both the electrode and the workpiece.

2.3.3 ELECTRICAL DISCHARGE MACHINING (EDM)

EDM is a process of material removal from electrically conductive materials, performed by creating a feature through electrical spark discharge between an electrode and the work piece (part) in the presence of a dielectric fluid. Once the spark is created between the electrode and the part, the metal removal takes place by vaporization of material. The vaporized material is removed from the area by flow of the dielectric fluid.

2.3.4 HEAT AFFECTED ZONE (HAZ)

The layer just below the recast layer created by the high temperature of the EDM spark. It exhibits a different microstructure (grain size, precipitate size, precipitate morphology, or precipitate distribution) than the base material. HAZ could weaken prematurely and cause the material to develop stress fractures that could lead to anything from a minor malfunction to a catastrophic failure. Typically, the HAZ is about half the thickness of recast layer.

2.3.5 MICROCRACK

A crack, break, or separation on the surface of the surface. Microcracks have sharp edges and can develop in any direction.

2.3.6 PROCESS PROCEDURE

Operation sheet, shop router, and/or work instruction. A document that contains at a minimum all applicable parameters in accordance with this specification.

2.3.7 RECAST LAYER

The layer of material created by localized melting of the work piece material, which solidifies before being removed. It has different physical and mechanical properties than the base material. The recast layer is attached to the base metal and may contain microcracks. The recast layer may be brittle or cracked, and its inclusion may lead to fracture initiation or propagation during use of the part. The HAZ formed underneath the recast layer is not considered part of the recast layer.

3. TECHNICAL REQUIREMENTS

3.1 Equipment

3.1.1 Calibration

All gauges, indicators, and inspection fixtures shall be under calibration per the processor's quality management system procedures.

3.1.2 The EDM machine and the supporting equipment shall be capable of controlling the control factors listed in 4.4.3.

3.1.3 Dielectric Fluid

3.1.3.1 The dielectric fluid shall be oil or deionized water.