SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2489

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Blackening of Steel, Touch Up Method

1. SCOPE:

1.1 Purpose:

This specification covers the requirements for an inorganic black coating applied at ambient temperature to steel to touch up black oxide coating in areas where the black oxide has been removed. This coating is intended only to visually change the surface to a black color, not to meet the requirements of any black oxide specification.

1.2 Application:

Ambient blackening of steel has been used typically for the touch-up of black oxide surface finish where it has been removed and when complete reprocessing in accordance with a black oxide specification, such as AMS 2485 or MIL-DTL-13924, is not practicable.

1.3 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 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS2489

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2484	Blackening Solution for Steel
AMS 2485	Black Oxide Coating

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM F 519	Mechanical Hydrogen Embrittlement Testing of Plating Processes and Service Environments

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094 or www.dsp.dla.mil.

MIL-DTL-13924	Coating, Oxide, Black, for Ferrous Materials

3. TECHNICAL REQUIREMENTS:

3.1 Procedure:

3.1.1 Coating shall be applied in accordance with manufacturer's instructions at ambient temperature with solution meeting the requirements of AMS 2484.

3.1.2 Application of the coating shall not degrade, remove, or discolor an existent black oxide coating, such as AMS 2485.

3.2 Properties:

3.2.1 Dimensional Change: Processing shall not cause a measurable change in dimensions equal to or greater than 0.0001 inch (2.5 µm) when measured with a micrometer having a measurement accuracy of 0.0001 inch (2.5 µm).

3.2.2 Adhesion: When wiped with a clean, dry, white cloth, there shall be no visual removal of this coating from the part nor shall there be evidence of coating transference to the cloth.

3.2.3 Hydrogen Embrittlement: Processing shall not cause hydrogen embrittlement determined in accordance with ASTM F 519.

3.2.4 Intergranular Attack: Processing shall not cause intergranular attack when viewed at 500X magnification.

3.2.5 Color: Shall be black or dark gray or have a reddish brown cast to the black color, but shall be free of red oxide coloration.

3.3 Quality:

3.3.1 Coating as received by purchaser shall be continuous and visually free from pits and other imperfections detrimental to usage of the coating. Slight staining or discoloration is permissible.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The processor shall supply all samples for processor's tests and shall be responsible for the performance of all required tests. When parts are to be tested, such parts shall be supplied by purchaser. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that processing conforms to the specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Adhesion (3.2.2), color (3.2.5), and quality (3.3) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Dimensional change (3.2.1) is a periodic test and shall be performed at a frequency selected by the processor unless frequency is specified by purchaser.

4.2.3 Preproduction Tests: All technical requirements of this specification are preproduction tests and shall be performed prior to or on the initial shipment of coated parts to a purchaser for each alloy and heat treatment, when a change in materials and/or processing requires approval by the cognizant engineering organization (See 4.4.2), and when purchaser requires confirmatory testing to be required.

4.3 Sampling and Testing:

4.3.1 Sample Configuration:

4.3.1.1 Except as noted below, actual parts shall be selected as samples for tests.

4.3.1.2 Hydrogen Embrittlement: The coating process shall not cause hydrogen embrittlement in ferrous materials. Testing in accordance with the requirements of ASTM F 519, Type 1A using notched round specimens, unless a different specimen type is specified by the purchaser, stressed in tension under constant load is required only when the parts 36 HRC or higher are coated. For test purposes the coating shall be uniformly applied on the smooth section of the specimen, with visual coating at the root of the notch.

4.3.1.3 Intergranular Attack: Specimens and test procedure shall be as specified by purchaser.

4.3.2 Sample Quantity:

4.3.2.1 For Acceptance Tests: The number of specimens shall be in accordance with Table 1. A lot shall be all parts of the same part number processed with the same batch of solution in each continuous eight hours of production and presented for processor's inspection at one time.

TABLE 1 - Sampling for Acceptance Tests

Number of Parts in Lot			Quality and Color	Adhesion
Up	to	7	all	3
8	to	15	7	4
16	to	40	10	4
41	to	110	15	5
111	to	300	25	6
301	to	500	35	7
501	to	700	50	8
701	to	1200	75	10
	over	1200	125	15

4.3.2.2 Periodic: Sample quantity and frequency of testing shall be at the discretion of the processor unless specified by purchaser.

4.4 Approval:

4.4.1 The process and control factors or a preproduction part, or both, whichever is specified, shall be approved by the cognizant engineering organization before production parts are supplied.

4.4.2 The processor shall make no significant change to materials, processes, or controls from those on which the approval was based, unless the change is approved by the cognizant engineering organization. A significant change is one which in the judgment of the cognizant engineering organization could affect the properties or performance of the parts.

4.4.3 Control factors shall include, but not be limited to, the following:

Surface preparation
Method for testing coating adhesion
Method for testing intergranular attack
Periodic test plan

4.5 Reports:

The processor of coated parts shall furnish with each shipment a report stating that the parts have been processed and tested in accordance with the requirements of this specification and that they conform to the acceptance test requirements. This report shall include the purchase order number, lot number, AMS 2489, part number, and quantity.