SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 2658B

Issued APR 1980
Revised MAR 2003

Superseding AMS 2658A

Hardness and Conductivity Inspection of Wrought Aluminum Alloy Parts

1. SCOPE:

1.1 Purpose:

This specification establishes hardness and electrical conductivity acceptance criteria of finished or semi-finished parts of wrought aluminum alloys.

1.2 Application:

This specification has been used typically for nondestructive testing of wrought aluminum alloy parts to aid in determining correctness of alloy, temper, and/or heat treatment, but usage is not limited to such applications.

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 ASTM Publications:

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

ASTM E 10	Brinell Hardness of Metallic Materials
ASTM E 18	Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 1004	Electromagnetic (Eddy-Current) Measurements of Electrical Conductivity
ASTM G 34	Exfoliation Corrosion Susceptibility in 2xxx and 7xxx Series Aluminum Alloys (EXCO Test)

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

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-1537 Electrical Conductivity Test for Measurement of Heat Treatment of Aluminum Alloys, Eddy Current Method

3. TECHNICAL REQUIREMENTS:

3.1 Equipment:

The equipment used for hardness and electrical conductivity testing shall meet the requirements of ASTM E 10, ASTM E 18, ASTM E 1004, or MIL-STD-1537, as applicable.

3.1.1 Verification: The hardness test equipment when in use shall be checked against test blocks at least once per day to ensure accurate and repeatable results. The conductivity test equipment shall require a periodic standardization every hour of continuous operation. Equipment which does not provide accurate or repeatable results shall be corrected and recalibrated.

3.2 Procedure:

3.2.1 Hardness: Shall be determined in accordance with ASTM E 10 for Brinell hardness and ASTM E 18 for Rockwell hardness.

3.2.2 Electrical Conductivity: Shall be determined in accordance with ASTM E 1004 or MIL-STD-1537.

3.3 Properties:

Parts shall conform to the hardness and electrical conductivity values in Table 1 for bare alloys and Table 2 for clad alloys after heat treatment or annealing in accordance with the applicable specification. Alloys/tempers not contained herein shall be referred to the cognizant engineering organization.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The inspection source shall be responsible for the performance of all required tests. Purchaser reserves the right to perform any confirmatory testing deemed necessary to ensure that hardness and conductivity conform to the specified requirements.

4.2 Classification of Tests:

Not applicable.

4.3 Sampling and Testing:

Shall be in accordance with the applicable heat treatment specification or as agreed upon by purchaser and processing vendor.

4.4 Reports:

The inspection source shall furnish with each shipment a report showing the actual minimum and maximum values obtained. This report shall include the purchase order number, AMS 2658B, heat treatment specification number, part number, and quantity.

5. PREPARATION FOR DELIVERY:

Not applicable.

6. ACKNOWLEDGMENT:

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS:

Parts not inspected in accordance with this specification or not conforming to the specified hardness and conductivity requirements, or to modifications authorized by purchaser, will be subject to rejection.

7.1 Nonconforming Parts:

Parts failing to meet the hardness or electrical conductivity acceptance values specified herein shall be either reprocessed in accordance with the limits of the applicable heat treatment specification or referred to the cognizant quality assurance organization for additional testing or evaluation.

8. NOTES:

8.1 A change bar (|) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of a specification. An (R) symbol to the left of the document title indicates a complete revision of the specification, including technical revision. Change bars and (R) are not used in original publications, nor in specifications that contain editorial changes only are clarified in ARP1917 treated by the user during the fabrication process.

8.2 Terms used in AMS are clarified in ARP1917 and as follows:

8.2.1 Parts: Finished and semi-finished parts also include raw material stock heat treated by the user during the fabrication process.

8.3 Dimensions and properties in inch/pound units are primary; dimensions and properties in SI units are shown as the approximate equivalents of the primary units and are presented only for information.

8.4 Purchase documents should specify not less than the following:

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8.5 Key Words:

Aluminum alloy properties, electrical conductivity, hardness

PREPARED UNDER THE JURISDICTION OF AMS COMMITTEE “D” AND “AMEC”

TABLE 1 - Bare Aluminum Alloy Hardness and Conductivity Acceptance Values

Alloy	Temper (1)	Hardness Brinell min (2)	Hardness Rockwell, min (3) B	Hardness Rockwell, min (3) E	Hardness Rockwell, min (3) H	Hardness Rockwell, min (3) 15T	Conductivity % (4)
1100	0	--	--	--	50 max	--	57.0 - 62.0
2004	T6	--	--	92.0	--	--	35.5 - 42.0
2014	0	--	22 max	70 max	95 max	--	43.5 - 51.5
	T3 (9)	100	65	95	--	82	31.5 - 35.0
	T4	100	65	95	--	82	31.5 - 35.0
	T6	125	78	102	--	86	35.0 - 41.5
2024	0	--	22 max	70 max	95 max	--	46.0 - 51.0
	T3 (9)	100	63	94	--	82	27.5 - 32.5
	T4	100	63	94	--	82	27.5 - 34.0
	T6	114	72	98	--	84	34.0 - 44.0
	T72	114	72	98	--	82	38.0 - 45.0
	T8	118	74	99	--	85	35.0 - 42.5
	T86 (9)	135	83	105	--	87.5	37.0 - 41.0
2124	T3	110	69	97	--	--	27.5 - 32.5
	T8	120	74	99	--	--	35.0 - 42.5
2219	0	--	22 max	70 max	95 max	--	44.0 - 49.0
	T3 (9)	95	60	92	--	79	26.0 - 31.0
	T31 (9)	96	60	--	--	--	26.0 - 34.0
	T37 (9)	100	62	93	--	81	27.0 - 31.0
	T4	100	58	90	--	78	28.0 - 32.0
	T6	110	62	93	--	81	32.0 - 36.0
	T8	115	71	98	--	83	31.0 - 35.0
	T87	125	75	100	--	84	31.0 - 35.0
3003	0	--	--	--	65 max	--	44.5 - 50.5
5052	0	--	--	70 max	95 max	--	34.0 - 37.0
6013	0	--	--	90 max	--	--	--
	T4	--	40	--	--	--	37.0 - 39.0
	T6	--	61	96	--	--	40.0 - 43.0
6061	0	40 max	--	--	75 max	--	(5)
	T4	50	--	60	--	64	(5)
	T6	80	47	85	--	78	(5)
6063	0	--	--	--	70 max	--	(5)
	T1 (9)	--	--	37	--	53	(5)
	T4	--	--	40	--	54	(5)
	T5 (9)	--	--	44	--	57	(5)
	T6	60	--	70	--	68	(5)

TABLE 1 - Bare Aluminum Alloy Hardness and Conductivity Acceptance Values (Continued)

Alloy	Temper (1)	Hardness Brinell min (2)	Hardness Rockwell, min (3) B	Hardness Rockwell, min (3) E	Hardness Rockwell, min (3) H	Hardness Rockwell, min (3) 15T	Conductivity % (4)
6066	0	--	--	40 max	--	--	42.0 - 47.0
	T4	--	--	85	--	76	34.0 - 41.0
	T6	100	65	95	--	82	38.0 - 50.0
7049	0	--	22 max	70 max	95 max	--	44.0 - 50.0
	T73	135	81	104	--	85	38.0 - 44.0
	T76	140	84	106	--	87	38.0 - 44.0
7050	0	--	22 max	70 max	95 max	--	44.0 - 50.0
	T73	135	81	104	--	85	41.0 - 44.0
	T74	135	82	105	--	86	40.0 - 44.0 (6)
	T76	140	84	106	--	87	39.0 - 44.0
7075	0	--	22 max	70 max	95 max	--	44.0 - 48.0
	T6	135	84	106	--	87	30.5 - 36.0
	T73	125	78	102	--	85	38.0 - 43.0
	T76	130	82	104	--	86	38.0 - 42.0
7149	0	--	22 max	70 max	95 max	--	44.0 - 50.0
	T73	135	81	104	--	85	38.0 - 44.0
	T76	140	84	106	--	87	38.0 - 44.0
7150	0	--	22 max	70 max	95 max	--	44.0 - 50.0
	T61 (9)	145	87	108	--	--	29.0 - 33.5
	T73	135	81	104	--	85	41.0 - 44.0
	T74	135	82	105	--	86	40.0 - 44.0 (6)
	T76	140	84	106	--	87	39.0 - 44.0
	T77 (9)	145	87	108	--	87	37.0 - 39.0
7175	0	--	--	--	95 max	--	44.0 - 48.0
	T6	135	84	106	--	87	30.5 - 36.0
	T73	125	78	102	--	85	38.0 - 43.0
	T74	135	82	104	--	--	38.0 - 42.0
	T76	130	82	104	--	86	38.0 - 42.0
7178	0	--	--	-	95 max	--	43.0 - 47.0
	T6	145	87	108	--	88	29.0 - 34.0
	T76	140	84	106	--	87	38.0 - 42.0
7475	T73	--	--	103	--	--	38.0 - 44.5
	T76	--	--	105	--	--	38.0 - 42.0 (8)