

Society of Automotive Engineers, Inc.
29 West 39th Street
New York City

AERONAUTICAL STANDARD

AS 29

IGNITION SHIELDING, AIRCRAFT

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Revised

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- I. ACKNOWLEDGMENT: A vendor must mention this specification number in all quotations and when acknowledging purchase orders.
- II. SCOPE: This standard covers two basic types of ignition shielding as follows:

Type I - Unfilled
Type II - Filled
- III. PROPERTIES: The shielding assembly shall be so constructed that when properly installed on the engine it shall minimize or eliminate radio interference originating in the engine ignition system.
- IV. REQUIREMENTS - GENERAL:
 - A. Ignition cables or conductors shall be enclosed throughout within a housing which is electrically continuous and so constructed as to protect the ignition cables or conductors against mechanical injury. Provision shall be made within the assembly to prevent condensation or any other fluid from reaching the spark plug terminal. The radio shielding shall be so constructed that the right magneto or distributor, when viewed from the end of the engine opposite the propeller shaft end, will supply the front spark plugs on radial type engines and the exhaust side spark plugs on in-line type engines when two magnetos or distributors are used.
 - B. The design of the shielding manifold shall be such that the individual cable within shall not be subjected to bends less than 3/4" radius except within the spark plug elbow. Wherever such bends occur as well as throughout the balance of the shield, there shall be no sharp metal edges likely to cause abrasion to the cable.
 - C. The shielding assembly shall be so constructed as to provide for ease of maintenance when assembled on the engine.
 - D. Interchangeability: Each part of the shielding assembly shall be readily and completely interchangeable with corresponding parts of assemblies of the same type and model made by the same manufacturer.
 - E. Flexibility: The magneto and spark plug conduits shall be of sufficient flexibility that no undue stresses are transmitted to the magneto distributor housing or to the spark plug elbows.
 - F. Mounting Lugs: Provision shall be made for grounding the shielding assembly through mounting clamps or lugs which shall be suitably attached to the manifold ring at intervals not greater than 18 inches, except in the case of cast manifolds where the manifold is adequately supported and the manifold is adequately grounded by other means.
 - G. Threads: Threads shall conform to Class 3, and surface roughness of threads shall not exceed 100 R.M.S. micro inches. See Figures 1, 2, 3 and 4.
 - H. Materials: Materials, or materials suitably protected, used in the construction

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of shielding assemblies shall be highly resistant to salt water, oil, gasoline or ethylene glycol at a temperature of 300°F.

- I. Markers: Except for cables which are permanently attached to the distributor and sealed in the ignition shielding, high tension ignition cables or conductors shall be marked on the distributor end with markers conforming to AMS 3585, bearing the proper magneto distributor block number.
- J. Bonding: Each conduit 8" or longer in length shall be equipped with a satisfactory bonding clip that shall, upon installation, make good electrical contact between the conduit and engine and prevent undue vibration and chafing between the conduit and engine. Extra support shall be provided as necessary to prevent chafing of the flexible shielding.
- K. Coupling: The junctions of all members which are coupled together shall provide a circumferential continuous metal-to-metal contact. Flexible conduits where used shall be so constructed as to be capable of being subjected to 10 lbs./sq.in. water pressure applied to the external surface for a period of 15 minutes without leakage.
- L. Joints: All joints on the manifold ring shall be capable of satisfactorily withstanding a temperature of 400°F for one-half hour.
- M. Identification: The means of identification shall be visible when the shielding assembly is installed on the engine and shall consist of manufacturer's name, type designation, part number, the pertinent standard to which the shield is made, and such other markings as are specified by the purchaser.
- N. Moisture Proofing: After the harness is assembled to the engine, the spark plug wells, elbows, and magneto distributor block wells shall be filled with a compound conforming to AMS 3087.

V. REQUIREMENTS - DETAILED:

- A. Ferrules: When ferrules are used on the flexible magneto or spark plug conduits, the joint shall withstand a static load of 130 pounds at room temperature without failure.
- B. Conduits: Spark plug conduits shall be capable of being bent around a mandrel of 2-3/4" radius and magneto conduits around a mandrel of 4" radius without damage or deformation of cross section.
- C. Protective Treatment: Protective surface treatments shall not be employed where their use in any degree impairs electrical conductivity. Where protective coatings are used, they shall not soften, chip, or blister when subjected to a temperature of 300°F in a normal atmosphere and shall be highly resistant to the action of salt and fresh water, oil, gasoline or ethylene glycol at 300°F.
- D. Joint Resistance: The resistance across any joint shall not exceed 0.001 ohm.

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- E. Specific Resistance: Specific resistance measured between the spark plug or magneto end of the flexible conduit, and the nearest electrical ground connection lug of the manifold ring to which the conduit is assembled shall not exceed 0.003 ohm per foot.
- F. High Potential Performance: In a completely wired shielding assembly, except for terminals, the unit shall be capable of withstanding a potential of 15,000 volts (R. M. S. value) at 60 cycles between the grouped ignition wires and the shield. There shall be no sparking or insulation failures during a period of one-half hour. After the terminals are installed, the unit shall be capable of withstanding 9,000 volts (R. M. S. value) at 60 cycles applied to the grouped leads for five minutes without sparking over.
- G. Weight: The weight of the radio shielding assembly completely wired, including spark plug elbows, shall not exceed 2.50 pounds per cylinder, for Type I, or 2.75 pounds per cylinder for Type II.
- H. Capacitance: The capacitance between the shielding and each ignition cable or conductor contained therein shall not exceed 150 micro-micro-farads for leads less than seven feet long. The maximum for any lead shall not exceed 250 micro-micro-farads.
- VI. SAMPLES: Samples for qualification test shall consist of one complete shielding assembly of each type or model upon which qualification testing is desired.
- VII. QUALIFICATION TESTS - TYPE I AND TYPE II:
- A. Endurance Test: The shielding assembly shall be subjected to an engine endurance test equivalent to model test of not less than 150 hours.
- B. Salt Spray Test: The salt spray test shall be conducted with the shielding assembly installed on the engine. Provision shall be made for producing 4% by weight salt water solution spray of 10 gallons per minute which shall be directed at the propeller. The engine shall be run at normal rated sea level power and normal rated speed for 30 minutes. The spray shall be immediately discontinued upon any evidence of speed reduction or missing. Speed reduction or missing shall be cause for rejection of the shielding.
- VIII. INSPECTION TESTS - TYPE I AND TYPE II: Inspection tests of shielding assemblies shall comprise detailed inspection for material or structural failures, workmanship, and conformity to the detailed requirements of the standard, followed by the High Potential Performance Test at 9,000 volts (R. M. S. value) at 60 cycles applied to the group leads without sparking over and the joint Resistance Test as prescribed in Paragraph V-D.