AERONAUTICAL
MATERIAL SPECIFICATIONS
SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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RINGS, FLASH WELDED
Aluminum and Aluminum Alloys

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

2. APPLICATION: Primarily for parts such as flanges and rings fabricated by flash welding roll-formed bar or shapes of aluminum and selected aluminum alloys.

3. MATERIAL: Material from which rings are made shall be as specified on the drawing.

4. FABRICATION:

4.1 Forming: Rings as applicable for the particular part shall be formed from suitably rolled, extruded, or forged shapes in the annealed or as-fabricated condition.

4.2 Preparation for Welding:

4.2.1 Formed rings shall be clean and free from foreign materials in the area of electrode contact and at the surfaces to be welded.

4.2.2 Formed rings may be preheated, before welding, as agreed upon by purchaser and vendor.

4.3 Welding: The ends of the formed rings shall be flash butt-welded together; unless otherwise permitted by purchaser, there shall be only one weld per ring. Welding shall be performed on a machine provided with accurate control of feed of joint during flashing, rate and distance of travel of sections to be welded, secondary voltage and current magnitude, and timing and current cut-off. The flash shall be maintained during the flashing interval of the welding operation. The amount of manual flashing, for purposes of pre-heating, shall be limited to 10% of the total flashing distance. The machine shall be capable of repeating the sequence of operations independently of the skill of the operator. A record of all machine settings and sequence of operations for welding each different ring shall be kept by the vendor and be made available to the purchaser upon written request.

4.4 Annealing: Unless otherwise specified on the drawing, the welded rings shall be annealed by heating to the proper temperature, for the proper time, and cooling.

4.5 Proof Testing of Welds (Sizing): Unless otherwise specified, each ring, after cooling to room temperature following annealing shall be tested to determine the quality of the weld. Each ring shall have flash and excess metal at the weld removed to within + 1/32 in. of parent metal surfaces either before or after annealing but before sizing. Preliminary sizing ø may be done before cooling, but final sizing shall be done at room temperature. The stress applied for final sizing shall be sufficient to provide a permanent expansion of not less than 1% across a 2 in. gage length centered on the weld. Sizing shall be performed in such a way as to provide uniform stress distribution throughout the ring.

4.6 When the drawing or applicable material specification requires heat treatment ø of the material, rings shall be so heat treated after sizing.

4.7 Restoration to Shape: If it is necessary to restore shape of rings following sizing, such operation shall be done on suitable presses and not by localized blows as from a hammer. Rings may be heated to a temperature not higher than ø the annealing temperature for such operation except that rings furnished solution heat treated or solution and precipitation heat treated shall not be heated to over 375 F nor for more than 30 minutes.

5. TECHNICAL REQUIREMENTS: Rings shall conform to the following requirements and, in the case of heat treatable alloys, shall be capable of meeting the following requirements after proper solution and precipitation heat treatment.

5.1 Tensile Properties: Test specimens, cut after final heat treatment of the lot, from welded rings processed to this specification shall conform to the following requirements:

Tensile Strength	
Through Welded Area	85% min of parent metal of the same ring
Elongation	
Through Welded Area	
Heat Treatable Alloys	25% min of parent metal
Non-Heat Treatable Alloys	60% min of parent metal

5.2 Hardness: Hardness of heat treatable alloy rings shall conform to the applicable material specification.

6. QUALITY:

6.1 Parts shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or performance.

6.2 Parts shall be subject to non-destructive testing as agreed upon by purchaser ø and vendor.