

Method for arc welding aluminum alloys using a consumable electrode with purification and preheating by a compressed plasma/open arc of a non-consumable electrode, in which a welding system is used that includes a combined torch containing a consumable electrode and a non-consumable electrode, arranged such that their respective axes form an acute angle, and such that the arcs initiated by the electrodes intersect the plane of the workpiece being welded at defined contact points at a distance  $D$  from one another, and a magnetic mechanism connected to the torch. In this case, the distance  $D$  is selected to prevent direct interaction between the arcs of the consumable and non-consumable electrodes. The arc of the non-consumable electrode is positioned ahead in the direction of welding; under the influence of the magnetic field, it oscillates transversely to the welding direction with an amplitude of 0...10 mm and a frequency of 10.... 1,000 Hz, ensuring preliminary cleaning of the aluminum alloy surface by removing the oxide film and simultaneously providing auxiliary heating of the surface. The arc of the consumable electrode is positioned behind the weld path; under the influence of a magnetic field, it oscillates longitudinally along the weld direction with an amplitude of 0–10 mm and a frequency of 10–100 Hz, thereby performing the actual welding of the workpiece.