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Plasma Torch for Plasma Ignition and Combustion of Coal ALEXANDR USTIMENKO, R&D Plasmotechnics, VLADIMIR MESSERLE, Retired — Plasma-fuel systems (PFS) have been developed to improve coal combustion efficiency. PFS is a pulverized coal burner equipped with arc plasma torch producing high temperature air stream of 4000 – 6000 K. Plasma activation of coal at the PFS increases the coal reactivity and provides more effective ignition and ecologically friendly incineration of low-rank coal. The main and crucial element of PFS is plasma torch. Simplicity and reliability of the industrial arc plasma torches using cylindrical copper cathode and air as plasma forming gas predestined their application at heat and power engineering for plasma aided coal combustion. Life time of these plasma torches electrodes is critical and usually limited to 200 hours. Considered in this report direct current arc plasma torch has the cathode life significantly exceeded 1000 hours. To ensure the electrodes long life the process of hydrocarbon gas dissociation in the electric arc discharge is used. In accordance to this method atoms and ions of carbon from near-electrode plasma deposit on the active surface of the electrodes and form electrode carbon condensate which operates as "actual" electrode. Complex physicochemical investigation showed that deposit consists of nanocarbon material.

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