Industrial steam plasma torches as part of the PLAZARIUM TPS industrial plasma system are designed to create a high-temperature plasma jet of large volume and thermal power. They can be used for any plasma gasification and hazardous waste elimination reactors with total-degree destruction producing pollution-free syngas (CO + H2), as well as for afterburners to clean the gas from impurities and other applications.

The advantages of Steam plasma torches as part of the PLAZARIUM TPS industrial plasma systems:

1) Plasma torches use steam as the plasma gas. Designed for use in air, nitrogen, argon, helium, and other plasma-forming gases, too.
2) TPS Plasma system may consist of a single plasma torch or multiple plasma torches (maximum power is not limited). The industrial plasma torches are made with a capacity of 30 to 350kW in one plasma torch.
3) Optional reserve industrial plasma torches allows the TPS industrial plasma system to operate non-stop 24 hours a day all year round.
4) Mobility (can be mounted on the vehicles, containers and mobile plasma gasification plants);
5) The bulk temperature of the heated steam (flare zone) is more than 5,000°C. Characteristics of the plasma torch can be controlled by varying the power and the plasma gas flow.
6) The plasma system can be partially or fully controlled by a higher-level control system. Fully automatic digital control is duplicated by manual control for increased reliability.
7) Maximum time life of consumable parts from 300 up to 1000 hours (depending on model)
Our products

TPS Industrial plasma systems
with steam plasma torches

The maximum power of the plasma system and the number of plasma torches is not limited.

TPS industrial plasma system

1) Power supply
2) Steam plasma torches (Power from 30 up to 350 kW per 1 pcs.)
3) Plasma torch starting system
4) Cooling system of the power supply and plasma torches
5) System for generation, heating and supply of the plasma-forming steam
6) Superheater
7) Plasma-forming media flow control device
8) Remote control and information display panel

Delivery service

- Customs & shipping + license and all agreement (only for export from Russia)

Startup at territory of customer

- Installation & training and commissioning

Additional options

Duplication of all the major systems

(pumps, compressors, tanks, etc.) to improve the reliability under difficult climatic conditions

Installing the reserve of plasma torch

For continuous operation 24 hours non-stop for a year or more (You do not stop the plant for the replacement of consumable parts, or in the case of service of the plasma system. You do not lose power inside the plasma gasification plant when stopping the main torch for maintenance)

The possibilities for upgrading the plasma system

To increase the capacity in the future
WATER-STREAM ELECTROARC PLASMA ADVANTAGES

About Steam Plasma Technology

1. Plasma Composition.
   Water-steam plasma consists of Hydrogen and Oxygen exclusively; both components are active reagents which take part in oxidation-reduction reactions.

2. No ballast, such as Nitrogen of Air Plasma, where its percentage is 78%.

3. Extremely High Temperature.
   Plasma jet temperature is able to destroy any organic or biological materials, securely destroy the most toxic poisons, melt and evaporate the most refractory inorganic compounds and significantly reduce waste volume.

4. High Enthalpy.
   Steam plasma has enthalpy that is greater than that of Nitrogen, Oxygen and many other gases and gas mixtures by an order of magnitude and yields to Hydrogen only.

5. Superior Steam Transport Properties – the same temperature and concentration regime is formed across entire reaction space while high-temperature steam pyrolysis.

6. Steam Plasma Gasification Process is insensitive to processed waste humidity.

7. No Explosion Hazard.
   Unlike Hydrogen Plasma water-steam plasma is not explosive.

   The feedstock is ordinary water H₂O, which makes water-steam plasma cheaper than other types of plasma.

   a) While reaction with chlorine-containing materials, water-steam plasma does not generate dioxine, one of the most toxic substances.
   b) Steam plasma provides complete carbon extraction from waste materials (with the steam conversion temperature of more than 1200°C there is no equilibrium carbon in the system), while solid residue produced in the course of all combustion processes contains 30% of carbon.
   c) Exhaust gases produced while steam plasma gasification do not contain nitrogen oxides. Hydrogen delivered to the reaction space with steam plasma decelerates reactions of gaseous sulfur, phosphorus and free chlorine formation, i.e. such gases, which are difficult to remove in gas purification unit. Given lack of oxidant and availability of such metals as Ca, Mg, Na, it is possible to assure fixation of sulfur and phosphorus into refractory compounds and their transformation into condensed phase, whereas chlorine can be fixed as HCl and removed from gas phase in gas purification system.
   d) Solid residue in form of vitrified slag is neutral and can be used in construction process. Ratio of solid residue weight to raw material weight reaches 1:400.

10. Steam Plasma Product High Quality – synthesis of gas (CO+H₂) and solid residue:
   a) The greatest heating power (maximum content of Hydrogen and absence of ballast substances like Nitrogen, CO₂ etc.) – 22800 kJ/kg.
   b) Maximum Hydrogen-Monoxide Number Y=H₂/CO.
   c) Syn gas can be used as necessary (utilized immediately, reserved for further utilization, transported to remote customer; it can serve as fuel for electric power generation or be raw material for synthetic fuel production) and make waste processing energy-independent.

11. Power Inputs calculated for production of equivalent fuel unit with heating value of 7000 kcal/kg are minimal compared to Oxygen or Air Plasma.

12. Power Input Reduction is possible:
    Combined steam-turbine, rotor engine and gas-turbine equipment can be used for electric power generation.

13. Plasma Torch is independent heat source, which makes it possible to control gasification process when waste composition alteration.
## COMPARISON OF THE EXISTING TECHNOLOGIES

<table>
<thead>
<tr>
<th>ECOLOGICAL INDICES</th>
<th>Steam Plasma Gasification</th>
<th>Air Plasma Gasification</th>
<th>Conventional Gasification</th>
<th>Combustion</th>
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<tr>
<td><strong>Contaminants</strong></td>
<td><strong>Emission Concentration of Contaminants, mg/m³</strong></td>
<td><strong>Maximum Permissible Level (According to EU Norms)</strong></td>
<td><strong>Steam Plasma Gasification, no more than</strong></td>
<td><strong>Complete destruction (2000°C)</strong></td>
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