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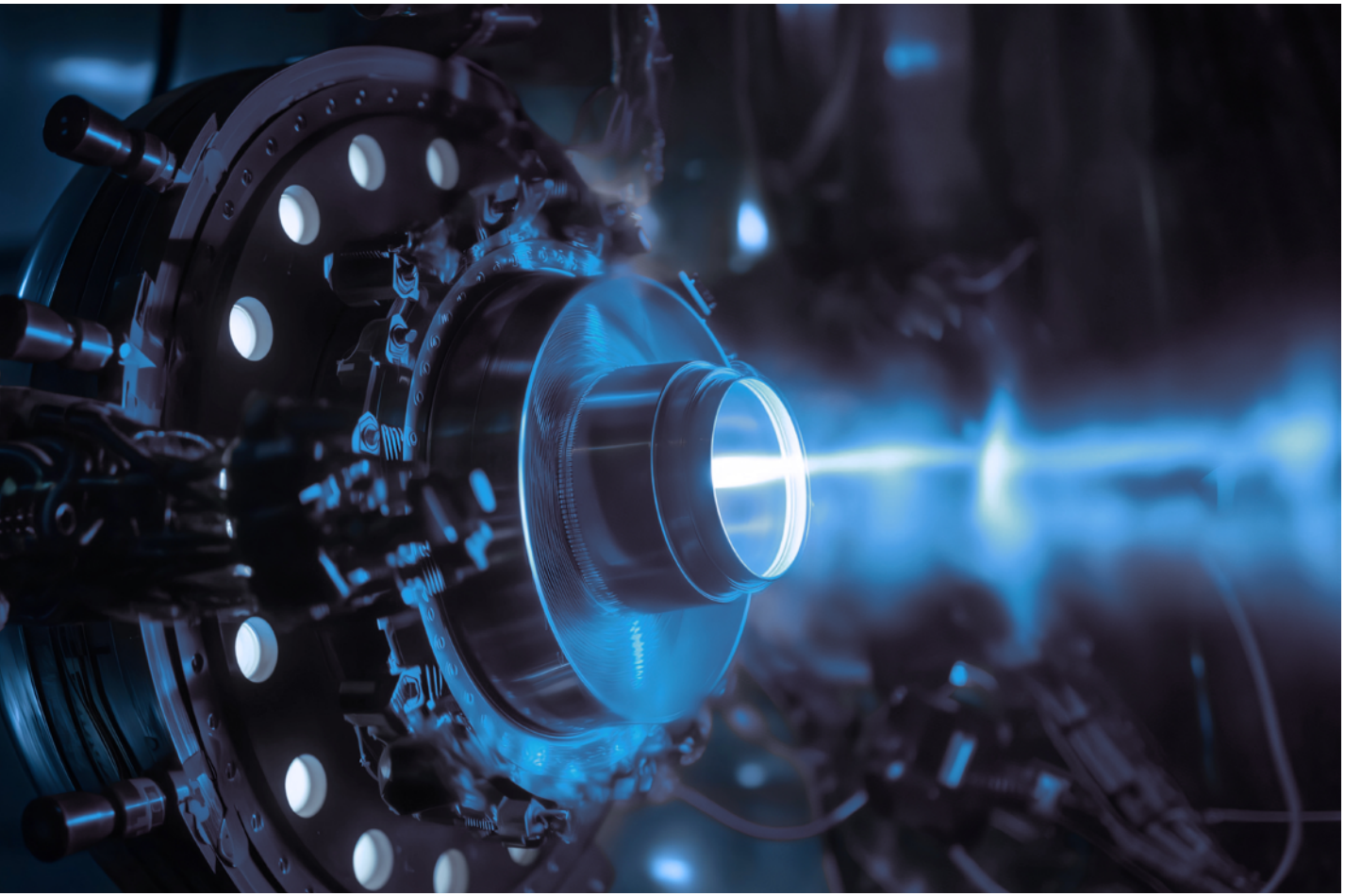
MESSER
Gases for Life

Xenon and Krypton - High Quality Gaseous Propellants for Ion Engines

Know-how and experience in the production, supply and use of rare gases in aerospace

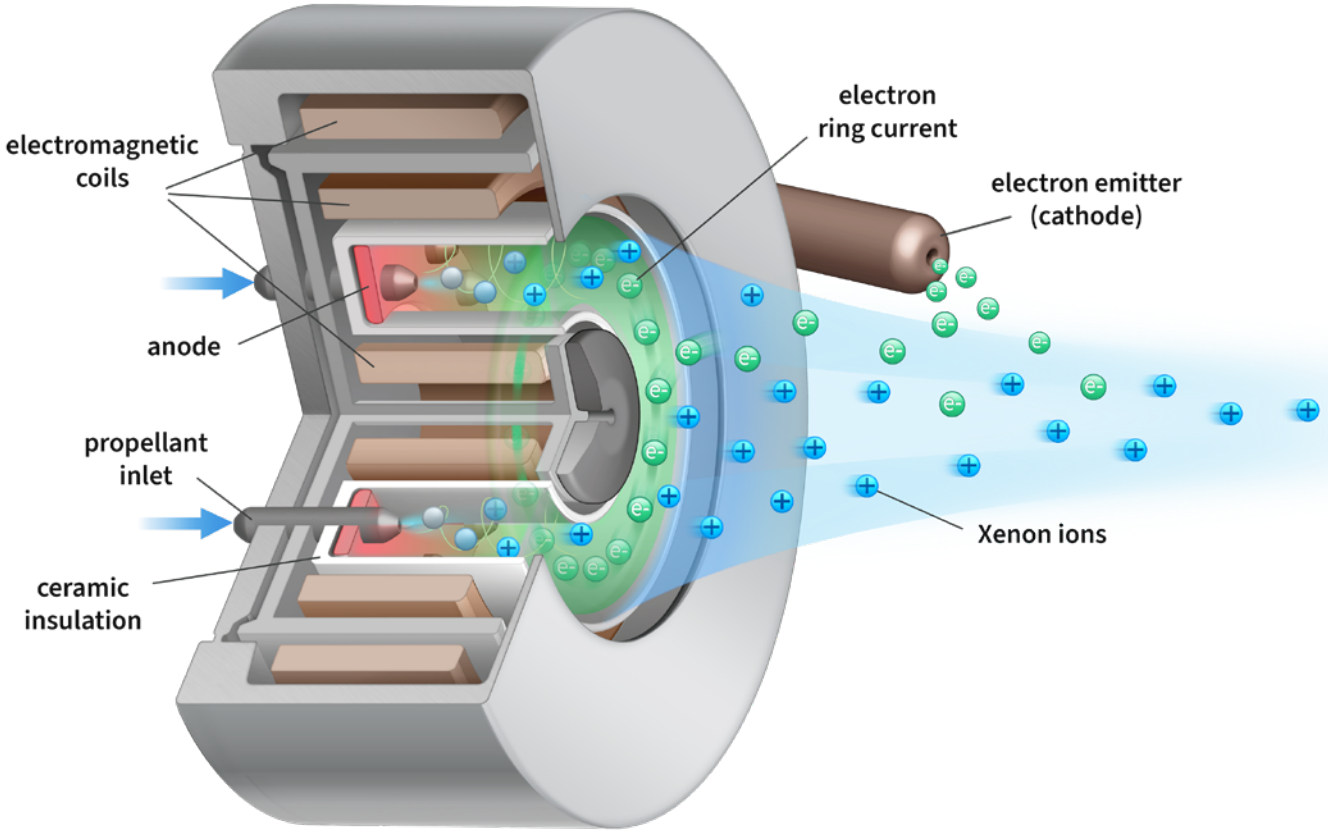
Xenon and Krypton – High Quality Gaseous Propellants for Ion Engines

Efficient Operation of Satellites in Space



Ion engines do not generate sufficient thrust for launching rockets. However, due to their lower working mass compared to chemical thrusters, they are suitable as secondary thrusters for energy-efficient continuous operation, for example for long trajectories. Ion engines are powered by high-purity gases such as xenon and krypton.

How does a Satellite Maneuver in Space?



Satellites with ion engines use a gaseous fuel and can generate thrust through two parallel processes: electromagnetic coils generate a magnetic field that causes electrons from an emitter to circulate in orbits. This electron ring current, combined with the anode at the propellant inlet, forms an electric field perpendicular to the magnetic field. At the same time, neutral xenon atoms are injected into the thruster as propellant via the inlet. As soon as a xenon atom collides with a drifting electron, it becomes ionized and accelerated by the electric field towards the thruster outlet. The resulting recoil generates a thrust, propelling the satellite. The emitted ions combine with other electrons from the emitter to form an electrically neutral plasma, which enables the efficient operation of satellites in space.

Specific Requirements

The propellants used in ion engines have to meet high specific requirements. Besides the level of purity, the composition of the remaining impurities plays an important role: as the amount of residual molecules can have a negative effect on the performance of an ion engine, it has to be minimized and adapted to the engine‘s specifications.

Production Process

In order to meet the requirements described, high-purity gases are used. Messer has established the specialty gases “Xenon 5.0 for ion engines” and “Krypton 5.0 for ion engines”. Both products are specially prepared for use in ion engines. As high-purity propellant gases, they have demonstrably low residues and meet strict quality specifications.

Multi-Stage Quality Control

Ion engine gases from Messer undergo a multi-stage quality control process that ensures they meet the stringent requirements of the aerospace industry and research. Production and delivery are fully documented and all steps in the supply chain are certified. This is how Messer ensures seamless traceability.

Reliable Supply for Rare Gases

Messer offers an extensive range of pure gases. This ranges from “air gases” (nitrogen, oxygen and argon), carbon dioxide, carbon monoxide and hydrogen over the most important organic (e.g. methane, ethane, ethylene, acetylene, etc.) and inorganic gases (e.g. ammonia, chlorine, sulfur dioxide, etc.), to high-purity rare gases (neon, krypton and xenon).

Messer also operates a reliable supply chain for the global supply of rare gases. High standards in our internal quality control and many years of expertise in the production of rare gases ensure a high product quality at our global production and purification sites. In addition to the rare gases neon, krypton and xenon, this also applies to our individual rare gas mixtures.

Xenon 5.0 and Krypton 5.0 for Ion Engines

Messer guarantees the traceability of its products along the entire supply and production chain – not only for the gaseous propellant, but also for the packaging.

To meet the stringent requirements of the aerospace industry, Messer fully documents and certifies all steps along the quality control chain.

Quality Control Chain

- Cylinder Preparation and Qualification
- N_2-Removal and Cylinder Filling
- Certification and Document Preparation
- Cylinder Pictures and Supply to Customer
- Application in Ion Engines

Traceable Documentation

- Control Plans
- Standard Operating Procedures
- Certificates
- Cylinder Specification
- Valve Specification

About Messer

Messer is the world's largest privately held specialist for industrial, medical, electronic, and specialty gases. Under the brand name ***‚Messer - Gases for Life'***, the company offers gases, services and technology in Asia, Europe, and America. The employees collaborate worldwide based on trust and mutual respect.

'Gases for Life' are indispensable in most industrial processes and help to meet the important requirements of our time. With customized gas solutions, Messer ensures greater safety, sustainability, efficiency, progress, and quality for its customers. Clean hydrogen, carbon capture and storage (CCUS), and Oxyfuel technology play a significant role in the decarbonization of industry and mobility.

Messer offers one of the largest product portfolios on the market and develops patented application technologies for gases in state-of-the-art competence centers. Messer's 'Gases for Life' are used in industry, environmental and climate protection, the food industry, the electronics industry, in the aerospace industry, welding and cutting technology, additive manufacturing, construction, for new energy, new materials and research and science. As a pharmaceutical company, Messer is a supplier of medical and pharmaceutical gases and complete solutions, proving itself a reliable partner for essential products.

Messer Image film ›

The company was founded in 1898 and is majority-owned by the Messer family.

Service and Advice

We are happy to advise you on the selection of suitable gases for ion engine, develop a customized solution for your requirements in close collaboration with you, and support you with our expertise in alignment with your technological advances. By combining expertise, customized solutions, high quality standards, and reliable product supply, we create the basis for a long-term partnership.

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