



**KHS PLASMAX**  
OPTIMAL BARRIER SOLUTIONS  
FOR SENSITIVE PRODUCTS

**KHS**  
Filling and Packaging – Worldwide



## Impermeable and invisible: Optimal product protection with Plasmax barrier

### High expectations of product quality

The barrier of a plastic packaging determines, for which kind of beverages, liquid food or non food a container, e.g. PET, is applicable. All essential properties for a reliable barrier to preserve product attributes of high quality juices, nonalcoholic beverages, beer, wine or lifestyle drinks such as „functional drinks“ are obvious:

The ideal barrier must be impermeable without reaction to the external environment or between the filled product and the packaging. Gases, like oxygen (O<sub>2</sub>) and carbon dioxide (CO<sub>2</sub>), that can migrate through the package wall, will invariably deteriorate the taste of the filled product and diminish its shelf life. The vitamin C content of juices will be degraded and the product's colour will change. Carbonated beverages, particularly in small bottles, lose their carbon dioxide content. Barrier protection must also be maintained at the highest possible level for a maximum period also under harsh climatic conditions to ensure that the packaging remains suitable for sensitive beverages.

### Versatile PET

PET is a plastic in big demand throughout the world on account of its virtually unrivalled benefits: light weight, transparent, not susceptible to shocks, economical to transport and totally recyclable, making it the ideal packaging solution, especially for beverages. Optimized barrier properties therefore ensure that PET materials can also be used to package particularly sensitive products to maintain their quality.

A competitive price for industrial mass production is another condition that a successful and effective barrier solution must fulfil in order to prevail on the market. At the same time perfect barrier properties must not impair the ability to recycle PET packaging on a bottle-to-bottle basis.

### Crystal-clear arguments for Plasmax

The coating methods used to meet all of these stringent demands are found in the Plasmax technology ensuring optimal, high-quality and flexible barrier coating of PET containers. This silicone oxide (SiO<sub>2</sub>) barrier thereby gives PET bottles properties which, in the past, were the exclusive domain of glass. Moreover, this method offers the following decisive advantages over other barrier solutions:

#### Food compatible:

The Plasmax glass coating is completely inert, i.e. non-reactive and therefore safe. Since there is no contact between the PET and the filled product, flavour scalping is eliminated. The permeation of gases and other substances, leading to the loss of vitamins and discolouration, are prevented so that the quality of the filled product is retained and shelf life extended.

#### Crystal clear:

PET bottles with a Plasmax barrier are colourless and completely transparent to make it a very attractive proposition for marketing.

#### Ecologically safe:

Contrary to multilayer and blend packaging, Plasmax-coated PET is 100 per cent recyclable and thus environmentally friendly.

#### Flexible and light:

Plasmax-coated PET packages are not susceptible to shock and significantly reduce transport costs on account of their much lower weight, making them superior to glass bottles.

#### Efficient:

InnoPET Plasmax installations are particularly efficient and score top marks in terms of Total Cost of Ownership.

#### Versatile:

In addition to beverage applications, the innovative Plasmax technology can also be used for liquid food such as ketchup and sauces, and significantly extends their shelf life. Furthermore Plasmax barrier enhances the application range of other plastics, including biodegradable PLA.



## Plasmax in the focus of our clients

**“High barrier quality and easy operation of the Plasmax system is highly appreciated by Eckes-Granini and is convincing in the daily production process.”**

Mario Dechent, Director Research & Development, Eckes Granini Group GmbH

**“Our employees are enthusiastic about how easily the Plasmax equipment can be operated. They quickly became familiar with the machine and are proud to be the first to commercially use Plasmax in Switzerland.”**

Pius Bernhardsgrütter, Chef d'Exploitation Eckes-Granini S.A.

**“As a converter we have the possibility to offer our clients absolutly transparent PET bottles with an optimal barrier protection for products like high quality edible oil with a Plasmax coating.”**

**In future we see various application possibilities for products needing a transparent barrier PET bottle.”**

Masaaki Ikezawa, General Manager at the R&D Center of HOKKAI CAN, Co. Ltd, Japan

**“We rely exclusively on Plasmax barrier-coated PET bottles for filling wine in our 187 ml bottles. They also fully meet our demand for top quality, as the taste of our wines remains unaffected thanks to the glass barrier coating.”**

Wendy Nyberg, senior marketing director of the Californian wine producer Sutter Home



## Optimized and patented: The coating process with the InnoPET Plasmax 12D

### Innovative technology

The InnoPET Plasmax machine uses the patented plasma impulse chemical vapour deposition (PICVD) process to coat the interior bottle surface with an extremely thin silicone oxide (SiO<sub>2</sub>) protective layer to prevent the migration of gases and other substances. The PICVD method ensures that all process parameters can be optimally adapted to the given bottle shape. It is applied to produce an effective and invisible coating, yet ensures that PET bottles remain fully recyclable.

### Consistant coating process

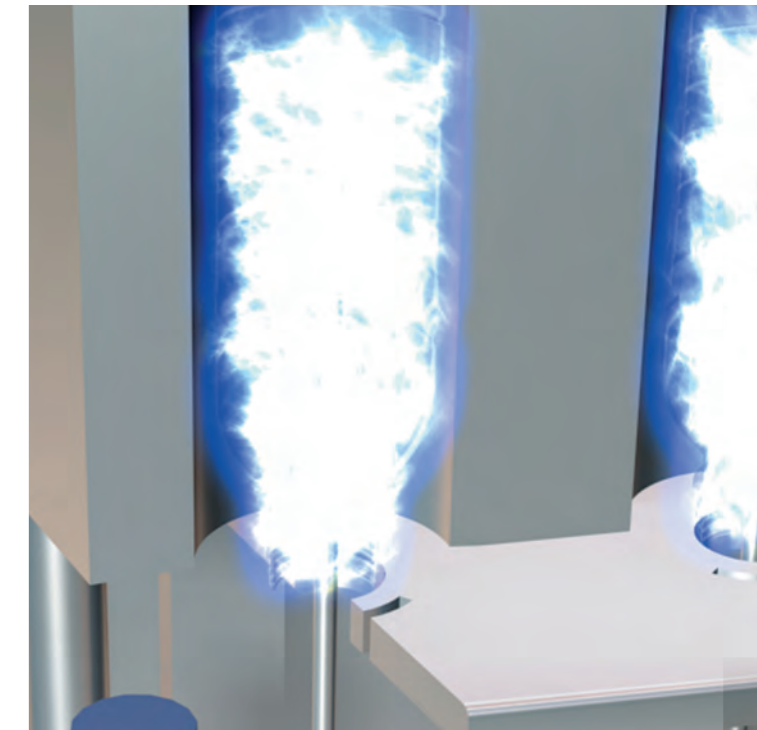
The InnoPET Plasmax machine completes the coating in several steps: Each of the vacuum chambers is loaded with bottles. A vacuum is then applied and a reaction-gas mixture is introduced that transforms the gas into an energy-rich plasma state using microwaves to complete the reaction. Silicone oxide is deposited onto the entire interior surface of the bottle with an ultra thin transparent, impermeable layer.

### Reliable installation

The InnoPET Plasmax machine is suitable for bottle sizes ranging from 100 millilitres to approximately 1.5 litres. The coating process is always optimally adapted to product-specific requirements.

Depending on the required barrier and bottle design, the InnoPET Plasmax with its 12 rotating double-coating stations achieves an output of up to 12,000 bph. Its performance can be synchronized with the up-stream and downstream units, e.g. a stretch blow molding machine and filler.

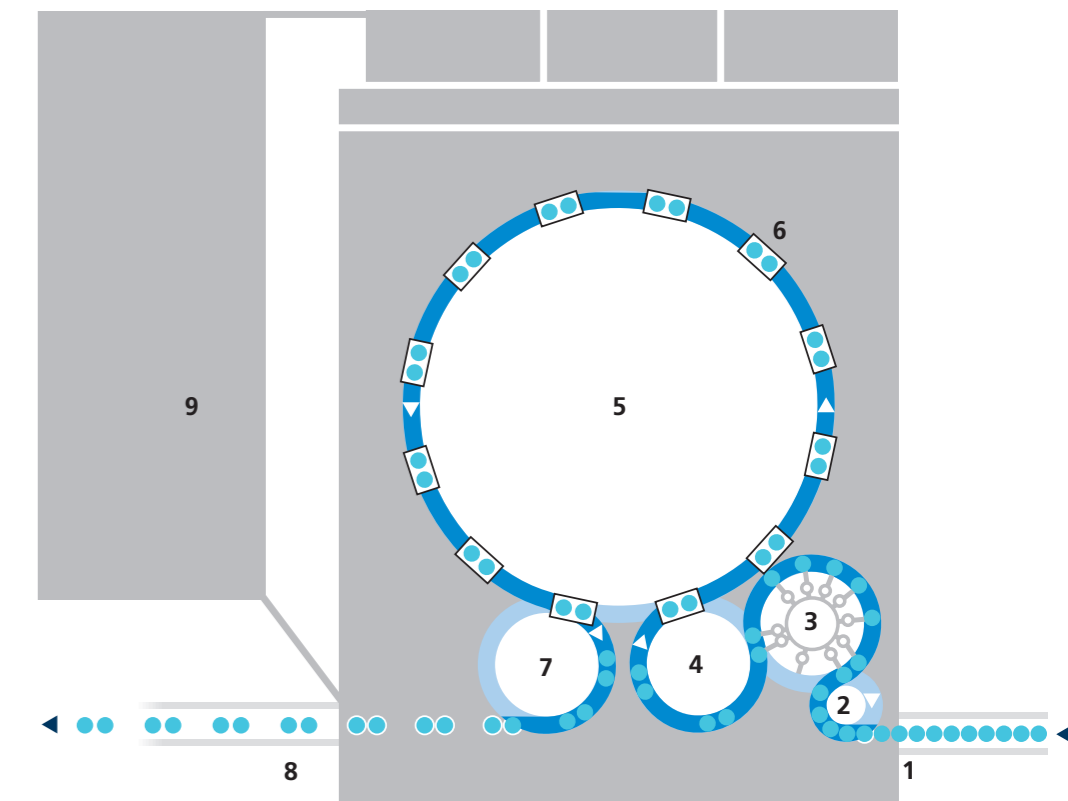
As a result of its excellent process stability, the InnoPET Plasmax machine guarantees an optimal barrier layer quality. All parts are readily accessible so that maintenance times are short, ensuring maximum uptime. In this manner the InnoPET Plasmax can be perfectly integrated into a packaging line for utmost operating efficiency.



PICVD plasma coating on the interior surface of the PET bottle

### Schematic bottle travel through the InnoPET Plasmax 12D (seen from above)

- 1 Bottle infeed
- 2 Bottle singling star
- 3 Loading wheel
- 4 Turning wheel 1
- 5 Coating wheel
- 6 Coating station
- 7 Turning wheel 2
- 8 Bottle delivery
- 9 Vacuum pumps



**The facts favour Plasmax barrier:  
optimum product protection, crystal clear, environment  
friendly, flexible, efficient and versatile.**



## InnoPET Plasmax 12D: Key features

**Capacity:** up to 12,000 bph

**Exact:** precise control and monitoring of the coating process that is individually adapted to the given bottle design and product requirements.

**Flexible:** simple and quick changeovers; in-line operation within an entire bottling line or off-line operation with a bottle palletizer.

**Economical:** high uptime and efficiency rates

**Readily accessible:** well designed for simple cleaning and maintenance

**User-friendly:** fully automatic machine and process control for simple operation

**Qualified:** competent KHS Plasmax service and process support

**Efficient:** low, extremely competitive Total Cost of Ownership

**Robust:** coatings that are insensitive to the typical mechanical and thermal stresses encountered during bottle filling and transport

**Approved:** internationally approved by the authorities for the use of coated PET bottles for beverages and food

Furthermore: **Transparent and 100% recyclable.**

## Technical specifications

Capacity	
bottle coating (bottles/hr)	up to 12,000
Bottle dimensions	
max. length (mm)	335
max. external diameter (mm)	100
volume (ml)	100 up to approx. 1,500
min. internal neck diameter (mm)	12
max. support ring diameter (mm)	48
Machine dimensions	
L x W x H (m x m x m)	approx. 6.1 x 6.2 x 4.2
number of coating stations	12 double stations



## Competence and close proximity to clients: KHS Plasmax GmbH

### Profitable PET refinement

Expertise forms the basis, visionary ideas are the driving force: KHS Plasmax GmbH is specialised in high-quality barrier coating of PET packages using the Plasmax method. Apart from sales, the range of services includes application consultations and support of operating installations. The KHS Plasmax experts are backed by the ultimate PET competence of the KHS Group with their experience in the field of stretch blow molding machines.

### Always one step ahead with InnoPET Plasmax

The Plasmax coating technology optimized by KHS Plasmax has significantly extended the areas of application of PET packaging: The process is being successfully used throughout the world by bottle producers and bottlers of sensitive, high-quality products.

### Crystal-clear opportunities in future through InnoPET Plasmax

Customized solutions meet the ever-growing market requirements: The products and concepts of KHS Plasmax are designed to ensure competitive advantage and quantifiable added value today and in future. This includes the further development of the innovative technology so that new trends and standards will also continue to be set in the future to take a leading position on the PET market.



### Global service

The global service network of KHS Plasmax is tuned to the requirements of the highly developed InnoPET Plasmax machines to ensure smooth, dependable production throughout their entire service life. Numerous branches and subsidiaries offer world-wide support in implementing innovative solutions. Our highly qualified service team ensures immediate support in the appropriate local language. Moreover, InnoPET Plasmax machines are fitted with a modem / Internet router to enable KHS Plasmax service engineers instant access to the process for rapid remote diagnosis.

## References

A successful product speaks for itself. We have already furnished convincing proof of the efficiency and effectiveness of our Plasmax barrier technology in practice.

For further details please refer to the different application examples presented on the "References" page on our website:

[www.khsplasmax.com](http://www.khsplasmax.com)

**"YOU CARE FOR THE CONTENT.  
WE CARE FOR THE FILLING AND PACKAGING."**

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