PET recycling system MetaPure
Improve your ecological footprint
Sustainability and economic efficiency: the bottle-to-bottle recycling concept

- **1.9 kg crude oil** is required to manufacture 1 kg of PET
- **In 2015, about 14.6 million tonnes of PET** were processed into PET bottles for the beverage industry
- **2.2 kg of CO₂** are released when producing 1 kg of PET

With PET recycling, you can reduce the CO₂ emission, save energy and resources:

**The greenhouse gas emission alone is reduced by 69.5 percent.**

Enough reasons to go for the PET recycling system MetaPure from KRONES. *(Source: IFEU)*

**At a glance**

- Recycling of PET containers into flakes or pellets
- Production of different material qualities—up to food-grade PET according to FDA or other certificates
- Available as a complete line or in individual modules for washing and decontamination
PET recycling: our line philosophy

- No use of water in the sorting process
- No washing out of label colours
- Only washing out the of the yield
- Use of units with low speeds
- Decontamination of flakes
- Use of a water cascade
- Caustic renewal/sedimentation
- Low use of energy and media
- Clear and straight-forward line visualisation system
- Easy operation
Food-grade rPET in three steps: Sorting, washing, decontamination

**Sorting**
- The sorting output quality depends on the material input quality.
- The poorer the quality of the input material, the higher the sorting requirement and thereby the resulting costs.

**Washing**
- The washing process is the most crucial process step for the quality of the recyclate.
- Poor washing quality cannot be compensated in the subsequent process steps.

**Decontamination, SSP and further processing**
- The flakes are decontaminated because this is quicker and requires less energy than decontamination in the pellet process.
- An additional cleaning step is required here, that is the extrusion in the double worm extruder with deaeration.
The front end

Separation of foreign matter and impurities and sorting of the input material

- Separation of the bottles
- Removal of undesired foreign matter and impurities such as wood, sand, glass and metal as well as plastic materials
- Removal of labels
- Grinding into PET flakes

→ The worse the input material quality the smaller is the yield – also with complex sorting lines.
The MetaPure W washing module

Excellent cleaning results with the KRONES washing technology

- Pre-cleaning
- Caustic renewal
- Separation of PO materials with the float-sink technique
- Multi-stage post-washer
- Drying

→ Thanks to gentle product conveyance and treatment system inside and between the individual units only very few fine particles are produced.
The MetaPure S decontamination module

The way to food-grade flakes or pellets

- Drying and heating of the flakes
- Decontamination of the flakes to remove migrated substances
- Solid state post-condensation (SSP) for increasing the intrinsic viscosity (IV)
- Cleaning by deaerating the melt during extrusion
- After the SSP: in-line processing of food-grade flakes into preforms possible

→ Since flakes can be decontaminated quicker than pellets, the MetaPure S is distinguished by its low energy consumption.
Automatic processes and quality monitoring

Every module of the MetaPure PET recycling system is equipped with its own line controller which is linked with a superordinated system control. The process information is transferred between the modules via the central system controller. Here, specified system parameters are compared and any deviations can be traced back in the overview.

Quality "traffic light"
- Red-green signal, in order to check the production quality on the central positions of the line as well as on the monitors of each module
- Pre-programmed and fully-automatic adjustment of the production parameters

System operation
- Operator panel with realistic 3D display of all machines
- Intuitive user guidance on the touch-screen
- Simple retrieval of the operating status and the query of the process parameters
- Ergonomically optimised operating situation
# Three system types

<table>
<thead>
<tr>
<th>System type</th>
<th>MetaPure (complete system)</th>
<th>MetaPure W</th>
<th>MetaPure S</th>
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<tbody>
<tr>
<td>Application</td>
<td>Recycling of PET bottles</td>
<td>Recycling of PET bottles to form PET flakes which will not come into contact with food or for further processing into food-grade applications</td>
<td>Decontamination and SSP** of washed PET flakes into PET flakes or pellets for direct contact in the food industry</td>
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<td></td>
<td>– into PET flakes or pellets for food-grade applications</td>
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<td>– or inline directly to preforms</td>
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<td>Output*</td>
<td>1,000 kg/h to 6,000 kg/h</td>
<td>1,000 kg/h to 4,500 kg/h</td>
<td>500 kg/h to 1,500 kg/h</td>
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<tr>
<td>Space requirement</td>
<td>600 – 3,500 m²</td>
<td>250 – 1,000 m²</td>
<td>250 – 500 m²</td>
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</tbody>
</table>

* Several modules can be combined with each other in order to achieve higher outputs.
** SSP – Solid State Polymerisation

Who can use MetaPure?

– Brand bottlers
– Private label bottlers
– Converters
– Recyclers
**KRONES as the integrator: everything from a single source**

KRONES does not only deliver individual modules, but it also offers a large range of services for PET recycling.

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<th>Project consulting</th>
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<th>Line construction</th>
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<td>Global service network</td>
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<tr>
<td>Interface planning</td>
<td>IV-value</td>
<td>Customer specifications</td>
<td>Quality control</td>
<td>Commissioning</td>
<td>Remote maintenance</td>
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<tr>
<td>ROI/TCO</td>
<td>Colour value</td>
<td>Health and safety</td>
<td>Functional test</td>
<td>Acceptance</td>
<td>Lifecycle service/maintenance contracts</td>
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<td>Tests with customer materials</td>
<td>Food-grade approval</td>
<td>Local standards and directives</td>
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**Process steps:**
- **Tests with customer materials**
- **Food-grade approval**
- **Local standards and directives**
- **Customer acceptance**
- **Documentation/training**
- **Laboratory support**
- **Mechanical installation**
- **Electrical installation**
- **Remote maintenance**
- **Global service network**
- **Spare parts supply**
- **Production support**
- **Commissioning**
- **Acceptance**
- **Lifecycle service/maintenance contracts**
- **Remote maintenance**
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- **Spare parts supply**
- **Production support**

**Key aspects:**
- **Engineering:** Concept engineering, Line engineering, Interface engineering, Customer specifications, Health and safety
- **Line construction:** Design, Procurement, Manufacturing, Quality control, Functional test, Customer acceptance
- **Service:** Ingress, Mechanical installation, Electrical installation, Commissioning, Acceptance, Documentation/training
- **After-sales:** Production support, Spare parts supply, Global service network, Remote maintenance, Lifecycle service/maintenance contracts, Laboratory support

**KRONES MetaPure**
Benefits to you

**Flexibility for the final product**
It's your choice: With MetaPure, you can produce food-grade flakes or pellets and even preforms for PET bottles.

**Open for any expansions**
Thanks to the decentralised module control, the line can easily be expanded by simply adding additional modules. The control of the entire line is performed centrally.

**Everything from a single source**
KRONES is the only provider of a homogeneous PET recycling system where the main components are well coordinated with one another.

**Efficient use of energy**
In comparison to conventional pellet decontamination, the flake decontamination has numerous energetic advantages thanks to its process temperature and low sojourn time.

**High media service life**
The multi-stage post-cleaning process ensures low fresh water consumption.

**Gentle material treatment**
Since the material in the heating conveyors is evenly heated, it is treated more gently than with comparable lines.

**Reduced waste water consumption**
The waste water pollution is reduced since 95 percent of the impurities are removed by employing separation technology before the washing process will be started.
Everything from a single source

**KIC KRONES colclean cleaning additives help optimising the PET washing process.**

Only harmonised process equipment and process consumables guarantee optimal results. This is achieved with KIC KRONES colclean additives.

**KRONES Lifecycle Service – your partner for performance**

Also after the purchase of your new machine, KRONES will take care of your lines: the KRONES LCS experts will always assist you and translate your goals and wishes into optimal LCS solutions.
We do more.

Digitalisation

Process technology

Bottling and packaging equipment

Intralogistics

Lifecycle Service