

PET Bottle Recycling System



ZHEJIANG BORETECH ENVIRONMENTAL ENGINEERING CO., LTD.

No.888, Jiuliting Avenue, Caoqiao Street, Pinghu City, Zhejiang, China.
T: +86-573-8512-0185 F: +86-573-8511-3959
E-mail: sales@bo-re-tech.com



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BoReTech
PET Recycling Equipment

Resources and Technology Integrator of
Recycled Polyester Industry

www.bo-re-tech.com

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The Only PET Bottle Washing Line for Food-grade B-T0-B Project in Asia.

More than **140** PET bottle washing lines are running all over the world



Project Shows



Professional PET Bottle Recycling System Supplier

BoReTech Brief

BoReTech is a resource environmental enterprise which integrates manufacturing, engineering and equipment supply.

BoReTech is devoted to develop large input capacity of smart PET bottle recycling system with full automation and intelligence. Meanwhile, BoReTech as resources and technology integrator of recycled polyester industrial chain supply turnkey service of PET bottle washing line, bottle-to-fiber and bottle-to-bottle engineering.

Started as a post-consumer PET bottle recycling factory in Taiwan in 1991, BoReTech began to enter the field of recycled polyester fibers production in 1994. BoReTech possess of more than 20 years' manufacture experience of PET bottle washing and recycled polyester staple fiber and is well acquainted with PET material characteristics and have abundant experi-

ence for PET flakes downstream applications and technological knowhow, which promotes the evolution and upgrade of PET bottle washing system constantly.

BoReTech has obtained ISO9000, ISO14000, CE certificate and carry out long-term technical and cooperation with the internationally well-known manufacturers of automation equipment and is an international leading manufacturer in the manufacturing of PET bottle recycling system.

The target of enterprise's establishment is to promote resource recycling in the world and support customer stepping into this booming industry effectively with our long-term engineering capability, create the best commercial value, encourage energy saving and carbon reduction for a cleaner and healthier earth.



Leading Supplier of Large Scale Food Grade PET Bottle Recycling System

Significance of Bottle Grade PET Recycling

Global growth of plastic consumer goods is projected to increase significantly over the next decade, especially in markets where waste-management systems are only just emerging. Without any action, it is predictable that the ocean could contain one ton of plastic for every three tons of fish by 2025, an unimaginable outcome.

Fortunately, this severe situation is changing and improving. Existing consumer plastics processing technology can give almost all used plastics a new life. By using recycled plastic material, the consumption of energy is 10 times less than virgin plastic and emission of CO₂ is 30-50% lower, which effectively reduce the pollution.

Compare with other plastics, PET is more fully recyclable due to its unique properties. It can be fully decontaminated to 100%

food-contact level and the physical performance could be fully restored to virgin level. But, only 8% of post-consumer PET bottles and other PET food containers are recycled to food contact bottles or containers globally at present. This bottle-to-bottle recycling has the highest level of economical and sustainable benefit. 90% plus of post-consumer PET material still follow so called "cradle-to-grave" path when valuable plastic material is converted into non-recyclable goods, such as polyester fiber or thermoformed containers for solid food.

BoReTech specializes in R&D and manufacture of bottle-to-bottle grade PET bottle washing line, meanwhile, supply bottle-to-bottle plant engineering and service to achieve PET resource recovery sustainably.

Advantages

Food Grade PET Bottle Washing Line Supplier in Asia

Compare with fiber grade PET bottle recycling, bottle grade recycling has higher quality requirement and processing design. In recent years, BoReTech focuses on R&D of large-scale PET bottle recycling system and washing technology always at the forefront of the market. At present, BoReTech washing line is the only one in Asia which can be used for food grade bottle-to-bottle project. It has been successfully applied to customer projects which supply food grade chips to Coca-Cola and Danone. With ability of waste water treatment engineering, pipeline engineering and automatic control, BoReTech can completely fulfill the plant establishment demand.

Modularization & Customization

So far, PET bottle recycling system does not have a standard process flow, for a new investor to step into this industry, learning cost and time could be dreadful and expensive. BoReTech supply series of standard units to customer based on different regions of PET bottle material composition and guide new investors to enter the recycling industry quickly and effectively. Every standard unit design occupies less space and reduces production cost. In addition, waste water treatment can decrease water consumption to be lower than 1m³ per ton PET flakes output. In the same time, BoReTech has a strong R&D team with more than 30 professional technicians, providing customized solution to improve customer product's competitiveness by equipment research and development.

Automation

Through intuitive graphic interface software linked directly with electrical devices to control the real-time information of plant production, the "Integrated Automation Solution (IAS)" system provides automated control solution for the PET bottle recycling plant management. The system can monitor all machine running statuses and conditions to fix any equipment problem in a timely manner. The IAS system can also generate equipment running statistics and advise operator to arrange maintenance schedule. With the effective IAS system in control, the smart PET plant can reduce operating and maintenance costs as well as enhancing plant safety and stable capacity. The IAS system can record and archive all plant production information, and provide real-time as well as historical trend data for production analysis. In addition, the system can print out pre-formatted plant data reports on demand.



PET Bottle Recycling System Flowchart

B-to-B Grade PET Bottle Recycling Line

PET Flakes Quality Standard Reference Table

Moisture (%)	<1
Label (ppm)	<15
PVC (ppm)	<30
Inorganic Compounds (ppm)	<10
Glue (ppm)	<10
PH	7.5±0.5
PP/PE (ppm)	<15
Metal (ppm)	<10
Total Impurity (ppm)	<100
* Flake Size (mm)	12

*Flake size can be specified by customers.

Estimated Plant Parameters

Input Capacity (kg/h)	Required Area (kW)	Installed Power (m ²)	Required Water (m ³ /hr)	Required Steam (kg/h)	Required Compressed Air (m ³ /min)	Manpower
1500	1500	600	2.25	700	3.5	5
3000	2000	900	4.5	1300	6.5	7
6000	3000	1000	9	2300	12	11
9000	4500	1600	14	3200	20	16

*The above parameters are calculated based on the standard configuration; PET bottle material composition and factory management level will affect actual consumption
 * Water consumption parameters are calculated based on using wastewater reuse system

Production Consumption Table-Average Energy Consumption per ton Flakes

Capacity (kg/h)	Electricity Consumption (KWH)	Steam (kg)	Washing Detergent (kg)	Water Consumption (ton)
1500	170	550	12	1.5
3000	160	500	12	1.5
6000	150	450	12	1.5
9000	145	400	10	1.5

B-to-B Grade PET Bottle Recycling Process Flowchart



Fiber Grade PET Bottle Recycling Line

Fiber Grade PET Bottle Recycling System Flowchart

De-baling → Metal Removal → Label Separation → Bottle Pre-washing → Manual Sorting → Crushing → Hot Flotation Washing → Friction Washing → Continuous Rinsing → Drying → Dust Removal → Packing

Estimated Plant Parameters

Input Capacity (kg/h)	Required Area (kW)	Installed Power (m ²)	Required Water (m ³ /hr)	Required Steam (kg/h)	Required Compressed Air (m ³ /min)	Manpower
500	800	170	0.75	200	0.5	8
1500	1200	400	2.25	700	0.5	12
3000	1800	600	4.5	1300	0.7	18
6000	2800	900	9	2300	1	30
9000	4200	1400	14	3200	1.5	40

*The above parameters are calculated based on the standard configuration; PET bottle material composition and factory management level will affect actual consumption
 * Water consumption parameters are calculated based on using wastewater reuse system

Production Consumption Table - Average Energy Consumption per ton Flakes

Input Capacity (kg/h)	Electricity Consumption (KWH)	Steam (kg)	Washing Detergent (kg)	Water Consumption (ton)
500	140	550	6	1.5
1500	130	500	8	1.5
3000	120	450	8	1.5
6000	100	400	8	1.5
9000	95	350	8	1.5

PET Flakes Quality Standard Reference Table

Moisture (%)	<1.5
Label (ppm)	<30
PVC (ppm)	<100
Glue (ppm)	<30
PP/PE (ppm)	<20
Metal (ppm)	<10
Total Impurity (ppm)	<200
* Flake Size (ppm)	12

*Flake size can be specified by customers

Process Intro



1 De-baling Section

De-baling unit adopts weighing-connected feeding device by high automation technology and break up bottle bales and remove mixed metal. The special knife structure can avoid any unexpected mechanical clogging.

Continuous Weighing Conveyor

Vertical Bale Breaker



Disk Screener

2 Sieving Section

Sieving unit including dry trommel, disk screener and metal removal device to separate some big impurities such as mud, sands and metals from PET bottles and flakes. Meanwhile, through digital technology like metal detector, pipe-type metal separator, metals can be separated automatically by flapping device to reduce inline manpower. Besides, belt-type metal separator can reach the same function.



Dry Trommel



Compact Label Remover

3 Label Separation Section

This label separation unit is mainly designed for heat shrinkage label removal.

Label separation unit from BoReTech has two types. One consists of patented label scrapping machine and label blowing machine which wind-force is adjustable. When facing limited space, the new design of compact label remover is also a good choice to scrap heat shrinkage labels and separate them by one machine.



4 Bottle Pre-washing Section

The primary features of this process are the automated water circulation system, continuous feeding and washing. This system uses special designed inner structure to cause friction for PET bottles inside the machine to remove most of adhesive labels, and uses the high-temperature chemical water to remove dirt, sands, glues, rubbers, metal and other impurities on the surface of bottles.

Batch pre-washing for the recycling of oil bottles can be adopted to ensure the sufficient contact time between bottles and chemical water, so that the oil can thoroughly dissolved, and finally achieving the cleaning performance.



Batch Pre-washer

5 Optical Bottle Sorting Section

BoReTech provides optical sorting machine and integration solution by cooperating with well-known sorting device manufacturers across the world. On one hand, automatic optical sorting machine can reduce the management cost and manpower requirement, and on the other hand guaranteeing the stability of sorting.

Non-PET, color bottles and metals can be detected and sorted out by NIR, optical sensor, optical camera and metal detector in this section. It provides guarantee the PET material's purity.



6 Manual Sorting and Crushing Section

Although automatic sorting can achieve high sorting efficiency, but it cannot guarantee 100% sorting precision. For high-grade downstream application of PET flakes, manual sorting is still required at present. Especially for areas with relatively lower labor cost.

Crushing unit grind PET bottles into flakes by relative mechanical motion of blades. BoReTech grinder adopts the wet crushing which achieves the washing effect through water added; on one hand, it can reduce the temperature due to generated friction and reduce the abrasion of the blades too; and moreover, it reduces the loss of the powder. BoReTech also provide sound-proof solution to protect operation labor from noise damage.



Process Intro

7 Flotation Section

Secondary washing of PET flakes after crushing is very important. Flotation unit separates PO& PP/PE caps which density is below 1 by using water as the separation media. This unit is comprised by flotation washing and packing silo. It's good to remove caps, rings to keep flakes with stable quality. And impurities of final products can be reduced to 100 ppm or even to 50 ppm.



8 Hot Washing and Friction Washing Section

This unit is comprised by hot washing with chemical water, turbo friction washing and automatic detergent dosing system. Closed-loop connection and reasonable collocation of the functions can effectively remove oil, glue and other impurities attached to flakes. All above control is automatic which reducing production costs and achieve high efficiency of the production process.



9 Continuous Rinsing and Flushing Section

The main idea of the process lies in the further separation of impurities and remove the detergent in chemical hot washing process. Fresh water is added to remove the detergent residual on flake surface during the previous hot washing and some separated suspended substance after the friction. It ensures the sufficient time of flakes washing.

This unit is consisting of continuous rinsing machine, rinsing tank and salt-separation tank if necessary. Flush washing is supplemented to separate impurities in maximum and make sure the cleanness and transparency of flakes. There are two options for reference.



10 Dewatering Section

De-watering process is running by high-speed mechanical centrifugal force, the moisture content of the flakes will be reduced to be less than 1%. If the heat-exchange air drying is supplemented later, the moisture rate of the flakes will be further reduced to be less than 0.7%.



11 Dust-removal Section

Combined with the years of experience in the production of PET industry, PET dust has potential negative impact on the downstream product process, especially the production process of POY and PET sheet.

Zig-zag separator can effectively separate the dust in the flakes, small plastic labels or film by taking advantage of the gravity and the special internal structure design.

The label aspirator separates the label and fine impurities from the flakes by the negative pressure which generated by blower, and can be used by multiple assembly.



12 Flakes Sorting, Blending and Packing Section

For high-grade PET flakes applications, automatic optical flake sorting unit is an indispensable module. The unit including automatic flake sorting, eddy current, and pipe-type metal separator. These devices would maximize the removal of impurities before packing to ensure the stability of flakes quality.

Flake with low impurity content and stable quality is a standard to measure PET recycling process. For the various quality factors during PET recycling process, blending equipment and on-line detection device especially designed can ensure the various quality indicators to meet criteria and to make sure no single parameter exceeding the requirement, so that the quality of the flakes will be guaranteed. On-line weighing device can monitor real-time production flow.

Packing unit, by taking advantage of the shaking system specially designed, can make the packing of the flakes reach the fix weight and maximize bulk density, which greatly reduce the packing and transportation costs.

On-line Weighing Device



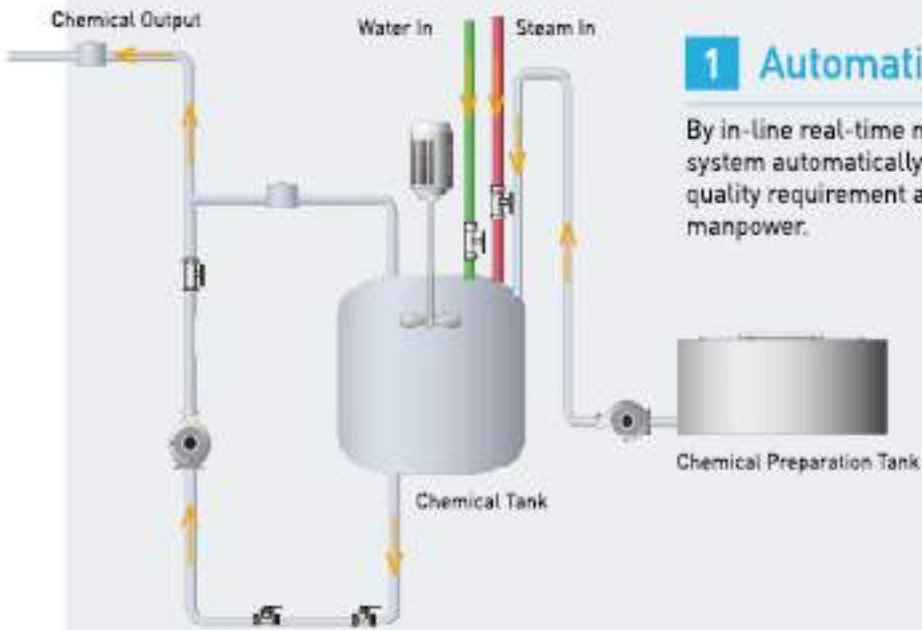
* The appearance color of above devices is only for display, not material of the device.

Optional Functional Unit

1 Automatic Detergent Dosing System

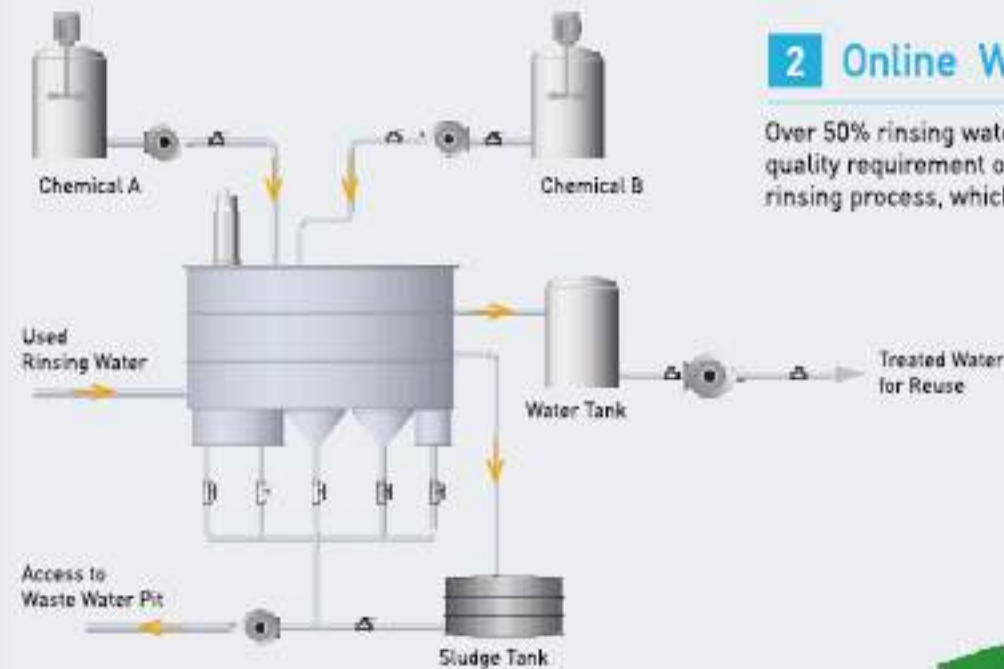
By in-line real-time monitoring of chemical concentrations, the system automatically doses prepared washing chemical according to quality requirement and/or cleanness of raw material and saves manpower.

Through metering pump, safety valve and other devices, preset program can prepare washing chemical under formulary ratio and dose it to needful machines automatically.



2 Online Water Saving System

Over 50% rinsing water can be processed to reach the quality requirement of industrial water for reusing it in rinsing process, which saves water consumption.



3 PET Fines Purification

PET fines from centrifuge or sieving device can be purified by PURIFINES system. The special design of separation technology will remove light material such as labels and heavy material such as metals and sands from PET fines and decrease material loss.

- High Speed Centrifugation
- Multi-step Separation
- Capacity: 500 KG/H



4 Integrated Automation System

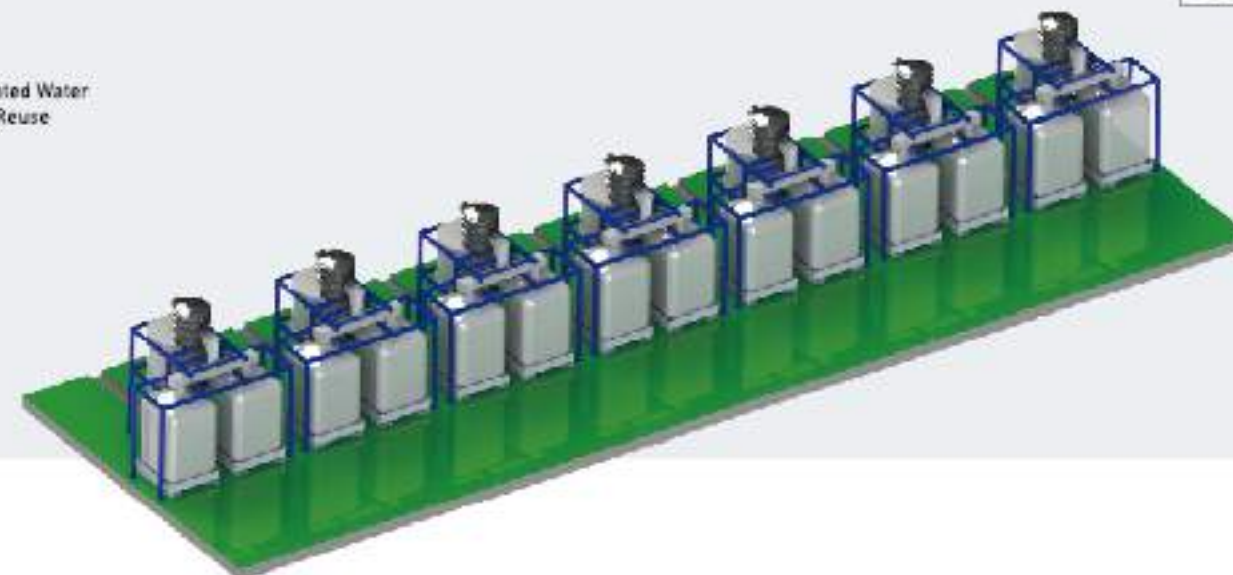
Using intelligent IAS to supply automatic factory management for PET bottle recycling system.

The system can monitor all machine running statuses and conditions to fix any equipment problem in a timely manner, which enhances plant safety and control stability.

截图(Alt + A)

5 Sub-Product Collection System

The sub-products such as caps and fines from every discharging point in washing process can be automatically transported to ideal location for packing them conveniently. The system will reduce manual handling.



Industry Chain



BoReTech is capable for turnkey project of product and service above