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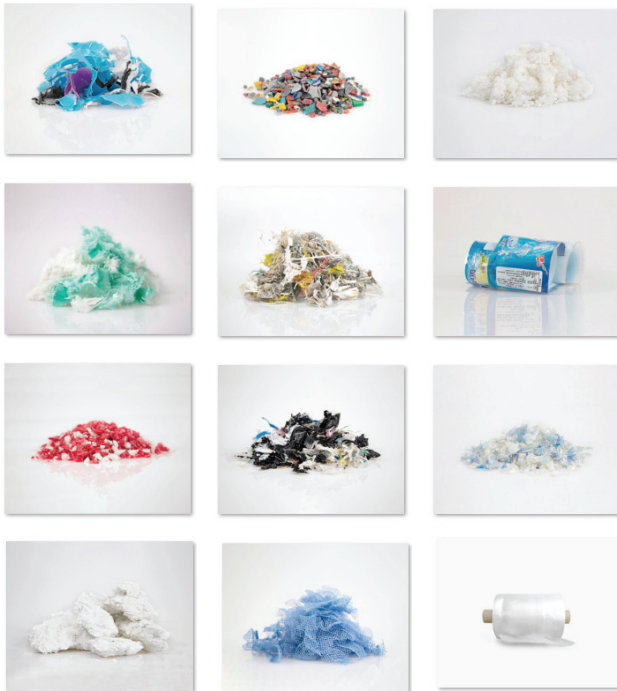


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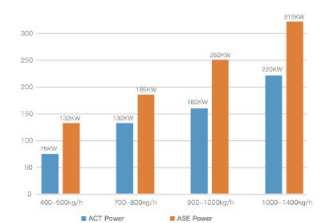
Plastic Recycling *Systems*

PLASTIC RECYCLING SYSTEM

CUTTER COMPACTOR RECYCLING PELLETIZING SYSTEM



Energy consumption comparison chart for ACT conical twin screw extruder and ASE single screw extruder



SINGLE STAGE CUTTER COMPACTOR Recycling Pelletizing Line

The TT-ACS-H series compacting and pelletizing system combines the function of crushing, compacting, plasticization and pelletizing to One step. Applied in the plastics recycling and pelletizing process. TT-ACS-H system is a reliable and efficient solution for plastics film, raffias, filaments, bags, woven bags and foaming materials re-pelletizing.

DOUBLE STAGE CUTTER COMPACTOR Recycling Pelletizing Line

The TT-ACSS-H series compacting and pelletizing system combines the function of crushing, compacting, plasticization and pelletizing to One step. Applied in the plastics recycling and pelletizing process. TT-ACSS-H system is a reliable and efficient solution for plastics film, raffias, filaments, bags, woven bags and foaming materials re-pelletizing.

The final product produced by the ACSS system is in pellet form and can be placed directly into the production line for the blown film, tube extrusion and injection moulding.

It consists of two sets of Single-Screw Extruders, suitable for printing ink heavy, high moisture content, poor fluidity and temperature-sensitive, high impurity content materials which requires the double filtration system, multiple exhaust and other higher requirements, and a longer process.

FEEDING

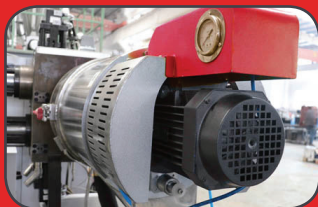


As standard design, plastic scraps such as film, filament, raffias conveyed into the compacting room through belt conveyor; to handle rolls' scraps, roll hauling off device is an optional feeding method. Motor

drives of conveyor belt and hauling device cooperate with ABB inverter. Feeding speed of conveyor belt or roll hauling off is fully automatic based on how full the compactor's room is. Metal detector can be combined with belt conveyor, and can interlock with control system, to warn and stop the system, in case that metal is found in feeding.

PELLETIZING

Die-face water ring pelletizing system set as the standard granulating method in ACSS-HTM system. Self-adjusting pelletizing head for the best granulate quality and long uptime thanks to consistently correct blades pressure. RPM of rotatory blades is automatic based on melt extruding pressure.



PLASTICIZATION AND DEGASSING

A specialized single screw extruder applied to gently melt the pre-compacted material. The plastic scraps will be well melted, plasticized in a 34D to 36D processing section. With double-zone vacuum degassing system, volatiles such as low molecular and moisture will be removed efficiently, especially suitable to heavy printed film and material with water content.



MELT FILTRATION

A regular single-plate/piston double-station screen changer or non-stop double plate/piston four-station can be installed on head

of extruder to present significant filtration performance. The requirements on the filter technology depend heavily on the quality of the input material as well as the planned use of granules.



CRUSHING AND COMPACTING

The rotatory blades of compactor with cut up incoming scraps. Frictional heating which caused by high speed rotatory blades will heat and let scraps shrinking just below their agglomerating point. Optional designed guide structure compacts the material and directs it into extruder screw. Crushes, dries and compacts the material which enables a fast and stable feeding from the compactor directly into the extruder.



VIBRATION DRY AND PACKING SYSTEM

Advanced dewatering vibration sieve combing with horizontal-type centrifugal dewatering present high performance dried pellets and lower energy consumption.

- Combine crushing, compacting and pelletizing steps in one system, less-labor cost.
- Higher efficiency feeding, suitable to film, filament, raffia, foaming materials;
- Higher output and lower energy consumption.



OTHER BENEFITS

- Lower investment cost for a high quality and durable machine
- Low energy consumption with high production output
- Service and support
- Overseas installation and training are available
- Machine warranty with spares in stocking and in-time delivery.

TECHNICAL SPECIFICATION

Machine Model	TT-ACS-H & TT-ACSS-H
Target Recycled Material	HDPE, LDPE, PP, BOPP, CPP, OPP, PA, PC, PS, PU, ABS
Final Product Shape	Particles
System composition	Belt Conveyor, Cutting Compactor, Single Screw Extruder, Filtration, Pelletizer, Water, Cooling Device, Dehydration Section, Conveyor Fan, Product Silo.
Output Range	150 kg/h-1200 kg/h
Feeding Device	Belt Conveyor (Standard), Roll Hauling off device (Optional)
Compactor Volume	300L-1400L
Diameter of screw	80mm-180mm (Standard)
Material of screw	38CrMoAlA (SACM-645), Bimetal (Optional)
L/D of screw	31/1, 32/1, 34/1, 36/1 (According to the characteristics of recycling)
Heater of barrel	Ceramic heater of Far-infrared heater
Cooling of barrel	Air cooling of fans through blowers
Vacuum deashing exhaust	Two Double-zone vacuum degassing system (Standard)
Pelletizing type	Water-ring pelletizing/ water-strands pelletizing/ Under-water pelletizing
Voltage Standard	According to the Voltage of the Customer's Location
Optional device	Metal detector, Roll hauling off device, Masterbatch and additives feeder
Warranty	13 months from the date of bill of lading
Technical services	project design, factory construction, installation and recommendations, commissioning

TWIN SCREW EXTRUDER COMPOUNDING & RECYCLING

As one of the professional twin-screw extrusion manufacturers, Torontech always strives to offer products that are par excellence. The TT-ATE Series is a Parallel Twin Screw Extruder for masterbatch and other plastic materials. Combined with a variety of cutting systems, this machine can provide more functions in the recycling system. Send us a message with any questions you have about us and our products.

AVAILABLE PRODUCTS



PARALLEL TWIN SCREW EXTRUDER



CONICAL TWIN SCREW EXTRUDER

PARALLEL TWIN SCREW EXTRUDER

TT-ATE series parallel twin screw extruder is driven by motor, torque distribution gearbox, processing part, temperature control device, mold part and downstream grain cutting system.

TT-ATE twin screw extruder adopts the principle of modular design and standardized production of components, so as to present stable and reliable performance.

With the principle of modularization, TT-ATE series extruding machines can provide highly customizable solutions according to customers' process and special requirements. Based on different output torque levels, there are two types of TT-ATE extruders: basic type and efficiency type.

TT-ATE co-rotating twin screw extrusion machinery combines a variety of cutting systems, such as water strands cutting system, die surface cutting system and underwater cutting system. Relay control and PLC control are both used in ATE electrical control system. All key electrical components are European branded to ensure significant stable performance of the control system.



APPLICATION

Typical applications:

Engineering plastics, masterbatch, filler, TPE, TPR, TPV, direct extrusion

APPLICATION I

Reinforcement and compounding, such as AS PP, PA, PBT, ABS, AS, PC, POM, PPS, PET with glass fiber or carbon fiber filler;

Mixing alloy, such as PC + ABS, PA+ ABS, CPE+ ABS, PP+ EPDM, PA+ EPDM, PP+ SBS, etc.

Filling and compounding, such as PE, PP, EVA and calcium carbonate, talcum powder, titanium oxide pigment and carbon black;

Cable materials, such as LDPE, HDPE, LLDPE, MDPE sheath materials, insulation materials; Radiant cross-linked cable material, etc.

APPLICATION II

Filling and compounding, such as PE, EVA filled with calcium carbonate, talc powder, titanium dioxide and carbon black;

Mixed alloy, such as PC + ABS, PA + ABS, CPE + ABS, PP + EPDM, PA + EPDM, PP + SBS, etc. LDPE, HDPE, LLDPE, MDPE sheath materials, insulation materials;

Radiation cross-linking material, coated optical fiber cable material, heat shrinkable pipe material, PPR pipe material, PR cross-linking pipe material;

Thermoplastic elastomers, such as TPR, TPU;
Master batch, such as PE, ABS, PS, EVA, etc.

Flame retardants, such as ABS, EVA, etc.

Degradable plastics, such as PE, PP and PS, etc.

APPLICATION III

Reactive extrusion, such as continuous reactive extrusion of PUR, PA, POM, PEI, PC, PMMA, PBT and PPS, ν vulcanization, crosslinking, grafting and elongation chains.

PVC cable material, plastic shoe material, coil material, medical material;

Low smoke and halogen-free materials or low halogen flame retardant materials; EVA material screen, PE and EVA color masterbatch, etc.

1. High-speed mixer
2. Screw loader
3. Gravity feeding system
4. ATE twin-screw extruder
- 5a. Water strands pelletizing system
- 5B. Water-ring pelletizing system
- 5d. Die-face hot cutting system
6. Products silo
7. Quantitative packaging scale

TECHNICAL SPECIFICATION

Parameters of TT-ATE Twin Screw Extruder

Machine Size	Dia. of screw (mm)	L/D	Screw speed Max. (rpm)	Torque per shaft (Nm)	Specific torque T/A3	Output (kg/h)
TT-ATE35	35.6	32-64	600	115	4.2	40-80
TT-ATE52	51.4	32-64	600	415	5.2	150-250
TT-ATE65	62.4	32-64	600	675	4.8	200-400
TT-ATE75	71	32-64	600	990	4.6	300-700
TT-ATE95	93	32-64	600	2365	5	550-1500



CONICAL TWIN SCREW EXTRUDER

TWIN SCREW EXTRUDER COMPOUNDING & RECYCLING



Conical twin screw extruder is an efficient mixing and extrusion equipment. The machine has the characteristics of small shear rate, difficult decomposition of materials, uniform plasticization and mixing, stable quality, high output, wide application range and long service life.

With the various specifications of the mold and auxiliary machine production line produced by our company, PVC powder can be directly made into plastic products of different cross sections such as pipes, plates and profiles, etc

APPLICATION

Conical twin-screw extruder has the characteristics of homogeneous plasticization, high yield, stable quality, wide range of application, long service life, direct molding of PVC powder, etc. With the corresponding moulds and auxiliary machines, all kinds of thermoplastics, especially hard polyvinyl chloride powder, can be directly extruded into plastic products such as pipes, plates, sheets, rods, membranes and profiles. The modification of various plastics and granulation of powder can also be completed. The conical twin-screw extruder has stable performance, can make melt well plasticized and extruded at lower temperature. The barrel is equipped with cast aluminium heater, which has high thermal efficiency, fast and uniform temperature rise. It is also equipped with cooling fan.

The specially designed transmission part adopts a new type of variable frequency motor or direct drive current motor, which runs smoothly, transmits large torque and has high efficiency. Through imported frequency converter or DC speed regulator, stepless and stable speed regulation can be achieved with high accuracy and energy saving.

APPLICATION CONT'D

Intelligent double display digital temperature controller is adopted, which has high control precision and small temperature fluctuation. It has functions of overload protection and fault alarm, constant temperature of oil circulation in screw core, oil cooling in barrel, and equipped with vacuum exhaust pipe device and quantitative feeding device.

FEATURES

Soft plasticization concept runs through the screw design, which provides a strong guarantee for the extrusion of PVC.

Reliable two-stage screw core external circulation temperature control system ensures that different formulations can produce high quality PVC products;

It has high efficiency and low noise air cooling system as well as reliable and effective vacuum exhaust system, high precision, wide speed regulation, forced quantitative feeding system, high performance gear box for reducing torque distribution, perfect precise temperature automatic control system, precise and stable speed regulation system.

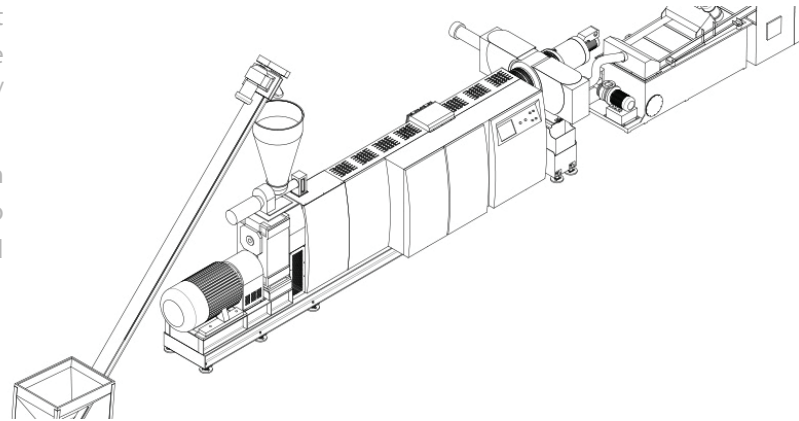
THEORY/METHOD

Machine Model	TT-SJZ
Target Recycled Material	PVC, U-PVC, C-PVC, O-PVC
Final Product	Compounding Pelletizing, Pipe, Plate, Profile, Sealing Strip
System composition	Vacuum powder feeder, Twin screw quantitative feeder, Conical twin screw extruder, Mold, Calibrator, Cutter
Output capacity	100 kg/h-1100 kg/h
Feeding Device	Vacuum powder feeder, Screw loader
Extruder Model	ACTE 51/105.55/110, 65/132, 80/156, 92/188, 110/220
Material of screw	38CrMoAlA (SACM-645), Bimetal (Optional)
Heater of barrel	Ceramic heater of Far-infrared heater
Cooling of Barrel	Air cooling of fans through blowers
Vacuum deashing exhaust	Two Double-zone vacuum degassing system (Standard)
Foaming type	Die-face cutting, Vacuum setting
Voltage Standard	According to the Voltage of the Customer's Location
Optional device	Metal detector, Roll hauling off device, Masterbatch and additives feeder
Warranty	13 months from the date of bill of lading
Technical services	project design, factory construction, installation and recommendations, commissioning

SINGLE SCREW EXTRUDER RECYCLING MACHINE

The TT-ASE series single screw extrusion and the pelletizing system is a specialized and reliable system, suitable to the recycling and re-pelletizing job of rigid plastic scrap. It combines the function of plasticization and pelletizing to one step and is ideal for crushed regrinds or flakes of PE/PP/ABS/PS/HIPS/PC etc.

Final productions produced by ASE single screw extrusion line are in the form of pellets/ granules, can directly put into the production line for film blowing, pipe extrusion and plastics injection, etc.



SINGLE SCREW EXTRUDER



Lumps or thick flakes after crushed, conveyed into the single screw extruder by screw loader, then, compress,, plasticize in the extruder and removed volatiles and moisture by vacuum system, after filtering through the filtration system, to pelletize into granules. Depending on the different screw diameters of single screw, the typical capacity can cover from 100kg/h to 1000kg/h.

TWO-STAGE SINGLE SCREW EXTRUDER



The application of two-stage granulation system in the work of recycling: It is composed of two sets of single screw extruders to recycle heavy dirty raw materials or greater output

FEATURES OF TWO-STAGE RE-PELLETIZING SYSTEM

- Segmented filtering principle, fore filtering in the first extruder, and fine filtering in the second extruder, to reduce the frequency of filtering sieves changing.
- Thanks to separated filtering system in two-stage extruder, system can realize steady extrusion job. Has one more volatilization between first and second extruder.

Second stage's extruder can present low temperature extrusion, which can guarantee the final production's quality.



PLASTIC PERFORMANCE KEEPING



Thanks to precise temperature controlling and optimized plasticization design, ASE-Pro system ensure the reliable quality output of plastic granules.

PROCESS

This is the most appropriate process for the need for better melt filtration and higher production. In the first stage, two or more single screw extruders can be designed for the two-stage pelletizing production line, and then they can enter the second-stage extruder at the same time.



GRANULATION METHODS



According to the quantity and type of materials, the production line can be equipped with three kinds of granulation methods: water circumferential cutting, water-cooled stretching, automatic stretching or underwater granulation.

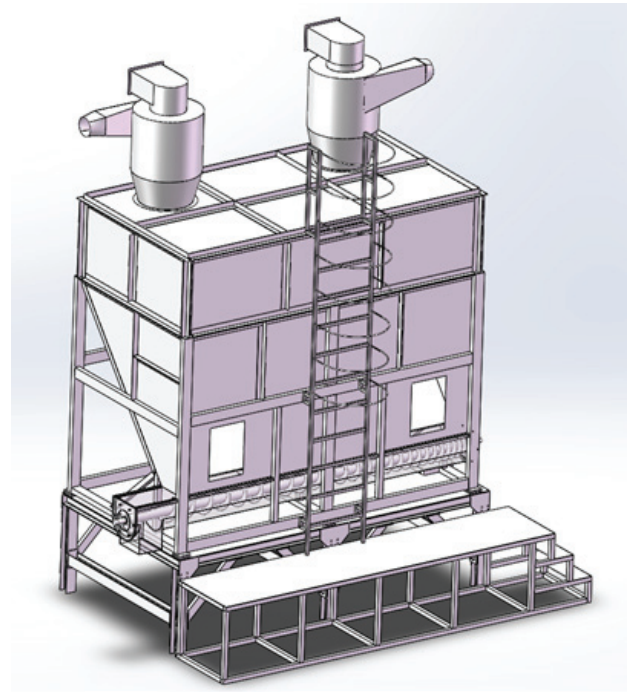
TECHNICAL SPECIFICATION

SINGLE SCREW EXTRUDER

Machinery size	Data of single screw extruder		Throughput rate (kg/h)
	Diameter of screw (mm)	L/D	
TT-ASE80	80	32	120-160
TT-ASE100	100	32	260-350
TT-ASE120	120	32	330-420
TT-ASE150	150	32	450-560
TT-ASE180	180	32	650-800
TT-ASE200	200	32	800-1000

TWO-STAGE SINGLE SCREW EXTRUDER

Machinery size		Diameter of screw (mm)	L/D	Throughput rate (kg/h)
TT-ADS100/120	ASE100	100	28	260-350
	ASE120	120	10	
TT-ADS120/150	ASE120	120	28	330-420
	ASE150	150	10	
TT-ADS150/180	ASE150	150	28	450-560
	ASE180	180	10	
TT-ADS180/200	ASE180	180	28	650-800
	ASE200	200	10	
TT-ADS200/220	ASE200	200	28	800-1000
	ASE220	220	10	



WASHING LINE

PLASTICS WASHING RECYCLING MACHINE

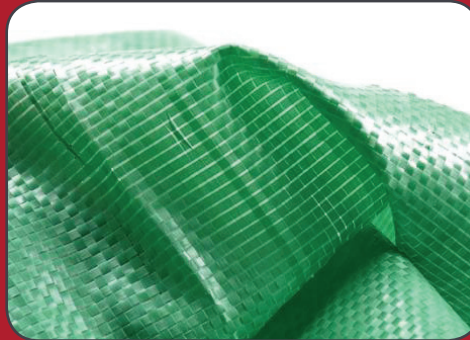
For the plastics recycling industry, Torontech can offer a series of well-developed Plastic Recycling Washing Lines for the efficiency of all kinds of plastics material.



AVAILABLE PRODUCTS



PE FILM WASHING
RECYCLING MACHINE

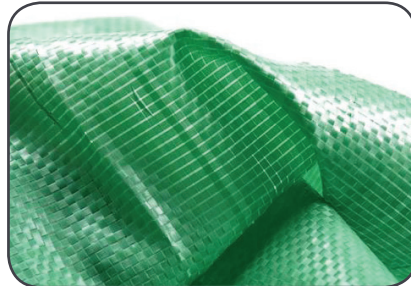


WOVEN BAG WASHING
RECYCLING MACHINE



PET BOTTLE WASHING
RECYCLING MACHINE

PE FILM WASHING RECYCLING MACHINE



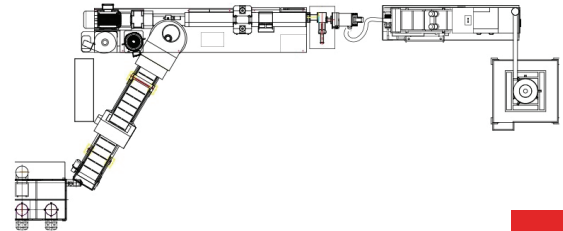
The plastic film is a secondary resource with very good recycling value, and the recycled film can reproduce film products, wood plastic products, etc., and has a wide range of uses. The shape, size, moisture content, and impurity content of the waste film are not the same. The types of plastic films commonly found in the recycling market are:

- Agricultural film (including greenhouse, mulch, greenhouse film and banana film, etc.)
- Production of post-consumer films (including collected from landfills and selectively collected)
- Commercial and post-industrial films (mainly in plastic bags and packaging films)

TECHNICAL SPECIFICATION

Device parameters			
Size	Capacity	Motor Power	Equipment footprint
TT-AWS PE 05	500 kg/h	150 KW	120 m2
TT-AWS PE 10	1000 kg/h	190 kW	260 m2
TT-AWS PE 20	2000 kg/h	290 KW	380 m2

Unit energy consumption	
Content	Average energy consumption per ton of bottle
Electricity	180-250 KW
Water	1.5 - 3T
Compressed air	0.5 - 1m3
Steam (optional)	0 -100 KG
Detergent (optional)	0 - 5 KG



WOVEN BAG WASHING RECYCLING MACHINE

TECHNICAL SPECIFICATION



IPP bags and film are also the most valuable secondary resources in the recycling market. It is a flexible pack-aging container with the advantages of moisture-proof, dust-proof, strong, safe and etc. It is used for the packaging and transportation of various dry products or materials.

The bag is woven from polypropylene and is widely used in chemical raw materials, pharmaceutical raw materials, plastic raw materials, food additives, feed additives, metallurgical powder, ore powder, refractory materials and other industries. The cleaning line specially designed for the tons of bags is composed of processes such as crushing, washing and drying.

Device parameters			
Size	Capacity	Motor Power	Equipment footprint
TT-AWS PP BAGS 05	500 kg/h	560 KW	150 m2
TT-AWS PP BAGS 10	1000 kg/h	680 kW	300 m2
TT-AWS PP BAGS 20	2000 kg/h	750 kW	450 m2

Unit energy consumption	
Content	Average energy consumption per ton of bottle
Electricity	65-85 KW
Water	4 - 6.5 T
Detergent (optional)	2 - 4 KG

PET BOTTLE WASHING RECYCLING MACHINE



PET bottle recycling is still an important recycling business in the recycling industry, even if the price of PET raw materials is low. Torontech team has many years of experience



in the PET recycling industry worldwide, and our recycling program is designed to reduce operating costs and obtain quality PET flakes.



With long-term experience in manufacturing a large number of recycling equipment, combined with detailed customer feedback on PET bottle cleaning lines, Torontech continues to improve PET recycling solutions, giving customers high-volume and high-quality bottle flakes and low operating cost recycling lines.



Bottle sheet production is suitable for the following applications:

- Bottle to bottle
- Bottle to packaging
- Bottle to fiber
- Bottle to sheet

TECHNICAL SPECIFICATION

Device parameters

Size	Capacity	Motor Power	Equipment footprint
TT-AWS-PET10	1000 kg/h	220 KW	250 m2
TT-AWS-PET20	2000 kg/h	260 KW	350 m2
TT-AWS-PET30	3000 kg/h	380 KW	500 m2
TT-AWS-PET40	4000 kg/h	500 KW	700 m2

Unit energy consumption

Content	Average energy consumption per ton of bottle
Electricity	70-90 KW
Water	1-1.5 T
Compressed air	0.5 -1 m3
Steam (optional)	250-400 KG
Detergent (optional)	4-8 KG

Bottle quality reference

Description	AA Class (ppm)	A Class (ppm)
PVC content	≤25	≤100
PE/PP/colored bottle/ metal/other	≤75	≤100
Total impurity	≤100	≤200

AUXILIARY EQUIPMENT

WASTE RECYCLING CRUSHER

The series of Crusher Machine from Torontech offers machine models with widths of 500 to 2000 mm and diameters of 300 and 800 mm for different rotor designs. Fully welded steel structures are designed to withstand the most demanding applications. The rotor bearing, the bracket of the knife and the rotor shaft are oversized. The standard V-cut creates a low percentage of high quality recycled material output. The detachable third stator blade acts as a deflection wedge and allows the machine to be quickly adjusted to different application scenarios. Other standard features include easy replacement of the wear plate in the cutting chamber and the risk of contamination of the outer bearing.

The Waste Recycling Crusher is available in a variety of rotors and hoppers, and is used throughout the plastics industry to recycle a wide range of materials. This series can be used for high-volume production, which can be used to recover large thick-walled materials in one step to fine particles or in the shredder for the second step of refining to meet various high-volume requirements. When used to break lightweight materials: for example, recycled



bottles, the yield can be greatly increased with the use of forced feeding devices by Torontech. For abrasives, contaminated or highly filled materials, the machine can be equipped with special wear protection devices such as rotors, housings and surface quenching of the main components.

APPLICATIONS

The series of Crusher Machines from Torontech are designed to meet the requirements for waste recycling of various thick-walled resins, wood, aluminum foil films, films, sheets, spheres, tubular structures or hollow containers. Conveyor belts, ventilators, storage bins and dust collection systems are more conducive to higher yields.

CATEGORY

- Compact soundproof crusher
- Economic crusher
- Heavy crusher
- Pipe & profile crusher
- Film bottle crusher

FEATURES

- External knife design, faster and more convenient
- Specially designed flow guiding devices are more widely used
- Multi-rotor design
- Mature machine casing design
- Permanent and firm welded steel structure



PLASTIC SHREDDER MACHINE

The shredder series is equipped with a powerful two-speed swing arm that eliminates the risk of clogging and wearing internal rails. The machine is used in a wide variety of applications and can be used to crush a variety of materials for different industries. Rotors with a diameter of 400-600 mm and a width of 800 to 3000 mm are driven by one or more gearboxes. In order to save space and protect it from damage, the hydraulic power unit is perfectly integrated on the machine casing, but it does not increase the difficulty of machine maintenance and is still easy to use or remove. The standard S-type rotor and Torontech's tool and tool holder design, the use of external bearings and hydraulically operated screen mounts have been recognized by customers and received good feedback.

This machine can further adjust the design according to the processing of the customer's processing waste. Customers can choose the cooling system, rotor surface material and other wear-resistant surfaces.



APPLICATIONS

The plastic shredder machines are designed to meet the waste recycling requirements of various industries. The input materials can be various kinds of plastics, such as block plastic, pipe, film, woven bag and other general waste recycling; such as cable and ICB electronic waste Recycling; recycling of household garbage from paper, wood and other organic materials. There are a wide variety of recyclable materials. Some materials can be directly recycled after being shredded, and some can be transported to GH series shredder for further refinement.

CATEGORY

- Heavy Duty Single Shaft Shredder
- Small single shaft shredder
- Double shaft shredder
- Standard single shaft shredder
- Large diameter pipe shredder

FEATURES

- Low speed, high torque, gear transmission
- Powerful swing hydraulic pusher
- Proven and well designed
- Compared to the horizontal push of the traditional shredder, it has a smaller Volume
- The bolt is on the drive shaft, easy to replace
- Multi-function rotor design and materials
- Standard two-speed hydraulic



ABOUT TORONTECH

Since our founding, Torontech has become one of the world's leading diversified manufacturers of specialized industrial equipment, consumables, and related service businesses. Torontech products and solutions are at work all over the world, in various industries. Our global network ensures our quality support towards our goal in providing the latest technologies in related fields globally presentable to our clients. We are never, whether we know it or not, more than a few steps from an innovative and yet cost-effective Torontech solution.

Throughout the past many years, at Torontech we've had the privilege of serving many top-ranking clients in North America and around the globe. Our fast growing customer base include many governmental institutions and organizations, universities and academic institutions, hospitals, manufacturing facilities, oil & gas companies, steel mills, Cement plants and Construction companies, as well as pharmaceutical industries, hospitals and healthcare organizations. To name a few, US Steel Corp, Morgan State University, Mitsubishi Cement, New Jersey Dept. of Transportation, Nucor Steel, Tubesa SA De CV, and Carrefour Group are amongst our VIP customers.



TORONTECH™

CONTACT US



Phone: +1 416 368 2721



Fax: +1 (416) 981-7652



Website: www.Torontech.com



Email: sales@torontech.com



Address: 7030 Woodbine Ave., Suite #500, Markham, Ontario, L3R 6G2, Canada