APPENDIX D.12

PRE-SHREDDER

(2 pages)

M&J 1000S

Shredding power

The M&J 1000S is a stationary shredder with two powerful shafts that run asynchronously and in both directions. The interaction between these two shafts moves the input material around, avoiding bridging and ensuring maximum throughput.

It is the smallest design in our range, with a capacity of 8–50 tons/hour depending on input, the number of knives specified for the cutting table, and the feed set-up.

The modular design makes it easy to adapt M&J 1000S shredders to meet specific operating requirements in new and existing plants. The combination of relatively small size and highly robust efficiency makes this shredder very versatile. This means you can use it for shredding an unusually wide range of inputs, even though it is designed for stationary installation.

See back for dimensions, drawings and tecnical specification.

Grain sizes

4 knives	< 450 mm
5 knives	< 350 mm
6 knives	< 250 mm
7 knives	< 150 mm

Capacity per hour

Household waste	up to 50 t
Industrial waste	up to 20 t
Bulky waste	up to 20 t
Wood	up to 30 t

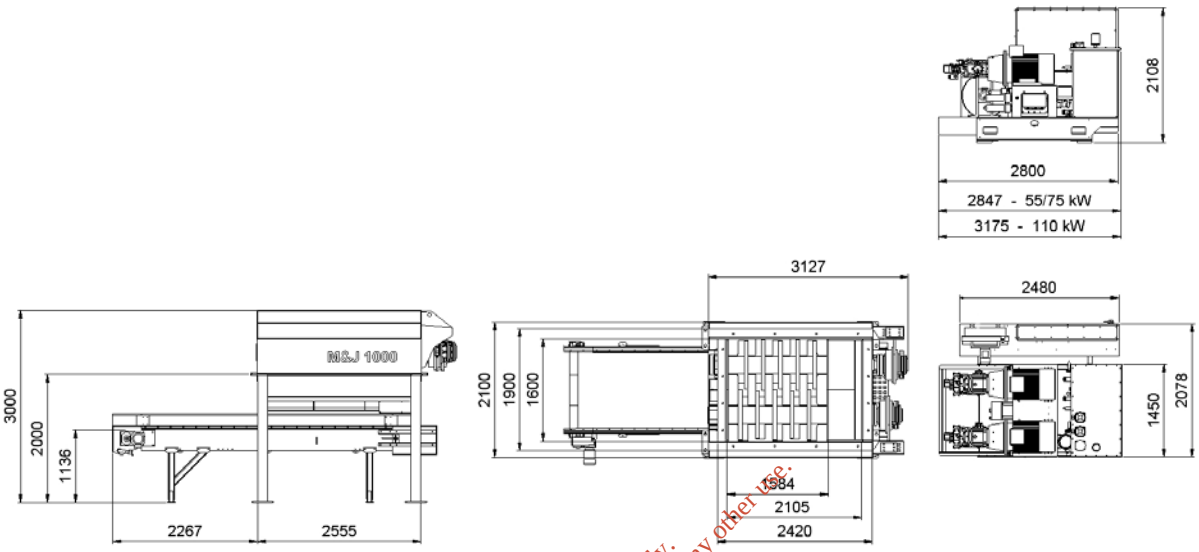
Whichever M&J shredder model you choose, you can:

- upgrade it with a different knives collaboration or powerunits, as and when your needs change.
- be sure of maximum reliability, with problem-free shredding in both directions, automatic lubrication systems and all functions PLC-monitored using intelligent software.
- benefit from our unparalleled experience, know-how and worldwide service set-up.

metso

M&J 1000S

Shredding power



The dimensions shown here are in millimetres.

Overview of specification

Overall dimension std. (L × W × H)	5300 × 2100 × 3000 mm
Weight in total	13.4–14.6 ton
Standard colour	RAL 2011 – Deep Orange, Corrosion class C2/M
Loading height (without hopper)	3008 mm

Power pack

Overall dimension std. (L × W × H)	2800 × 2078 × 2108 mm
Electric motor	2 × 55 kW / 2 × 75 kW / 2 × 110 kW
Electric control unit	PLC
Drive principle	Double hydrostatic transmission
Weight	3 ton

Cutting table

Number of shafts	2 – Asynchronous drive
Rotating speed (standard/HDC power pack)	25–37 rpm / 25–52 rpm
Number of knives	2 × 4 / 5 / 6 / 7
Number of counter knives	2 × 8 / 10 / 12 / 14
Cutting area (L × W)	1584 × 1600 mm
Weight	8.2–9 ton

Chassis

Standard belt conveyor (L × W)	4500 × 1200 mm
Discharge height	1136 mm
Discharge width	1200 mm
Weight (incl. / excl. conveyor)	2.1 / 1.1 ton

For more information, contact your local Metso representative.
www.metso.com/recycling

APPENDIX D.13

DRUM SEPARATOR

(2 pages)

NIHOT®
www.nihot.nl

Nihot

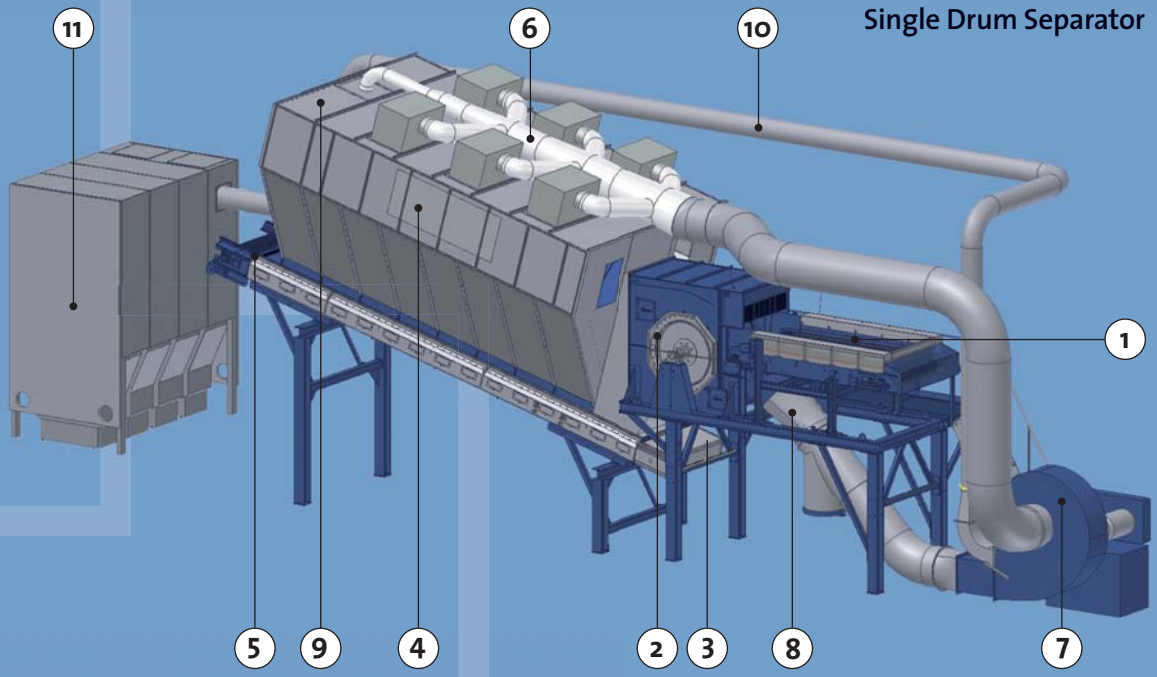
Drum Separator

Solutions in air-controlled separation

In waste processing, controlled air is a perfect separation medium, both in terms of process technology and business solutions. Controlled air is one of the core technologies of Nihot. It is versatile, offers greater flexibility than mechanical separation technologies and it guarantees high separation efficiency. By using air, materials can be separated based on both material density and shape. Nihot, has optimized air technology for waste separation. The company is a recognized key player in its field.

The Drum Separator is a combination of a recirculation fan, a separation section with a rotating drum and a connecting expansion room. It is the best separating solution based on density of the material at capacities up to 100 t/h of input and up to 25 t/h of separated light fraction.

Single Drum Separator



1. Product Input Conveyor (PIC)
2. Splitter drum
3. Heavy fraction output
4. Expansion room
5. Light Fraction Conveyor (LWC)
6. Air return ducting
7. Recirculation fan
8. Air nozzle
9. Exhaust room
10. Duct to dust filter
11. Dust filter

Types/performance

The Drum Separator is standarized, and can be supplied with an effective width of 500 to 2000mm.

We offer the following types:

- SDS: Single Drum Separator
  Separates input into two fractions: heavy and light
- DDS: Double Drum Separator
  Separates input into three fractions: heavy, mid-heavy and light
- High capacity system – up to 100 t/h
- High separation efficiency – up to 99 %

Benefits USP

- Versatile – processes many different waste streams, including high moisture content input
- Gives control of the caloric value of the output
- Removes interferants from input, thus protecting the granulators in RDF refinement
- Low maintenance and few wear parts i.e. reduced downtime
- Can handle large fraction sizes (plastic and film)
- Low dust emission

These benefits result in fast return on investment, low operating costs and superior reliability.

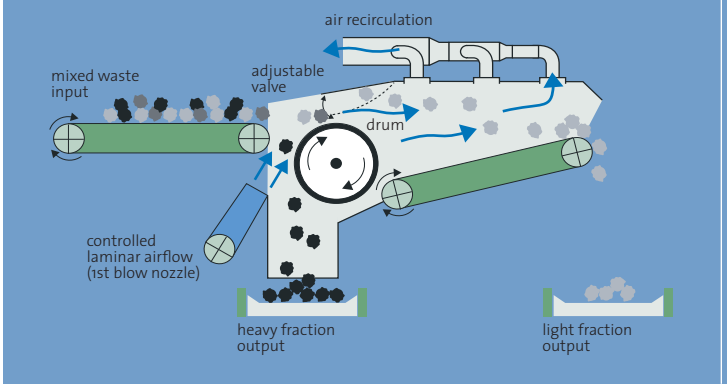
Applications

The Drum Separator is utilized for the separation and/or upgrading of the following Waste qualities.

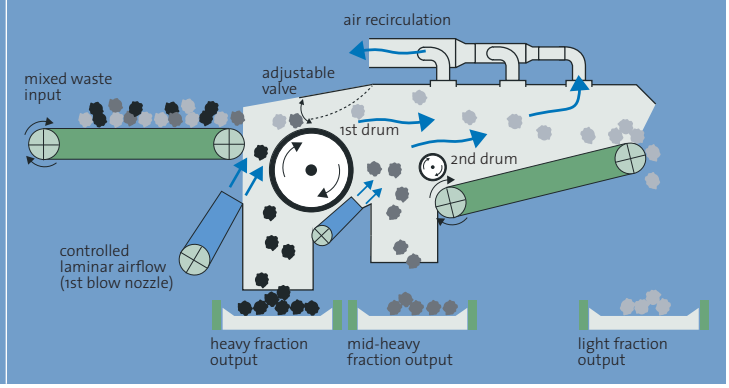
- Municipal Solid Waste (MSW)
- Commercial and Industrial Waste (C&I)
- Construction and Demolition Waste (C&D)
- Compost Refinement section
- Waste from Electric and Electronic Equipment (WEEE)
- Biomass/Wood recycling
- Refuse Derived Fuel (RDF)
- Bottom Ash Upgrading
- Single Stream (DSD/PMD)
- Glass
- Other abrasive materials

Drum Separator, the operating principles

SDS: Single Drum Separator



DDS: Double Drum Separator



NIHOT®
Nihot Recycling Technology B.V.

Generatorstraat 16, NL-1014 AT Amsterdam, PO Box. 20524, NL- 1001 NM Amsterdam
Tel: +31 (0) 20 58 220 30, Fax: +31 (0) 20 58 220 39, Internet: www.nihot.nl

APPENDIX D.14

EDDY SEPARATOR UNIT

(4 pages)

Eddy Current Separators

Models: New RevX and LC

A comprehensive and diverse range of non-ferrous metal separators providing unique separation solutions for the dynamically changing recycling industry.

Features

- Designed for ease of installation into new and existing recycling plants
- Simple to operate
- Flexible and easy adjustment to maximise separation performance
- Low energy consumption
- Wide range of sizes (300mm up to 2000mm feed widths)
- Different magnetic rotor designs to suit specific separation objectives
- Robust

Applications

- Recovery of aluminium, copper, zinc, etc from car frag (3mm - 150mm)
- Installed after a heavy media system to further improve metal recovery (3mm - 60mm)
- Extract aluminium beverage cans from either pre-sorted or mixed refuse (300mm)
- Purify small granulated plastic by ejecting aluminium contamination (2mm - 3mm)
- Remove aluminium rings and bottle tops from crushed glass cullet (12mm - 30mm)
- Separate non-ferrous metals from incinerator ash (3mm - 30mm)
- Expel aluminium from foundry sand (3mm - 30mm)
- Salvage aluminium from crushed dross (3mm - 30mm)
- Many others

ERIEZ®

Models

Recycling demands for excellent separation but at a level of investment that keeps the whole project viable have resulted in Eriez developing a wide range of Non-Ferrous Metal Separators. Each model is designed with a specific separation objective in mind.

The New Rev NM Models

Magnetically designed to provide enhanced separation of non-ferrous metals.

Two versions available:

NM-S For the separation of particles sub 25mm in size, especially below 10mm

NM-L For the separation of particles above 25mm

Each version has a different magnetic configuration to achieve maximum separation. Ideally suited for purifying cullet and plastics, and recovered valuable metal from secondary metals and incineration ash.

LC Model ECS

This most robust model is designed for the separation of larger non-ferrous metals. The specifically configured magnetic rotor is ideal for arduous environments with minimum maintenance. Commonly installed in Material Reclamation Facilities (MRFs) to recover aluminium beverage cans and car recycling plants to separate larger aluminium directly after the shredder.

Shredded steel and aluminium can separation at a UK plant

ECS Module at an incineration ash recycling plant

Separation of very small (sub 5mm) aluminium chips from plastics

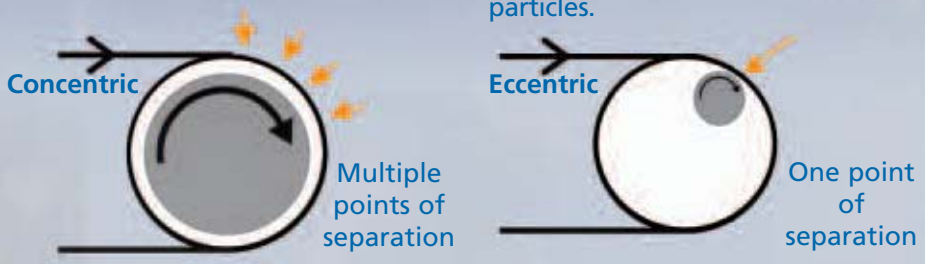
Recovery of non-ferrous metals from incineration ash

Aluminium dynamically ejected fr metallics

All the Eriez ECS have concentric magnetic rotors i.e. maximum magnetic expulsion force over the whole area of the outer shell.

Eccentric magnetic rotors only have one small point where optimum separation can be achieved.

In process terms, this means that on an eccentric style ECS there is one chance of separating a particle whilst on a concentric design, the magnetic force is working against the particle for the whole time it is in the magnetic field. This enables better separation, especially of small particles.



ECS Design Concentric versus Eccentric

Eddy Current Separator Systems

When there is a requirement to separate non-ferrous metals, there usually is a reciprocal need for ferrous metal separation.

Eriez has designed a range of modular systems where customers can purchase one complete unit to separate ferrous and non-ferrous metals.

Typical Modules:

1. Drum and ECS RevX

One or two Magnetic Drums with either standard strength ferrite or high strength Rare Earth elements to remove ferrous metals and stainless steel prior to the ECS/RevX. A feeder is used to control and evenly distribute the material onto the drum surface.

2. CP Magnet and ECS RevX Module

Commonly installed in Materials Reclamation Facilities. A CP Permanent Suspended Magnet is suspended over a large vibrating feeder to remove steel cans before the material then passes into the ECS/RevX.

rom non

Specifications

Diagram of an Eddy Current Separator

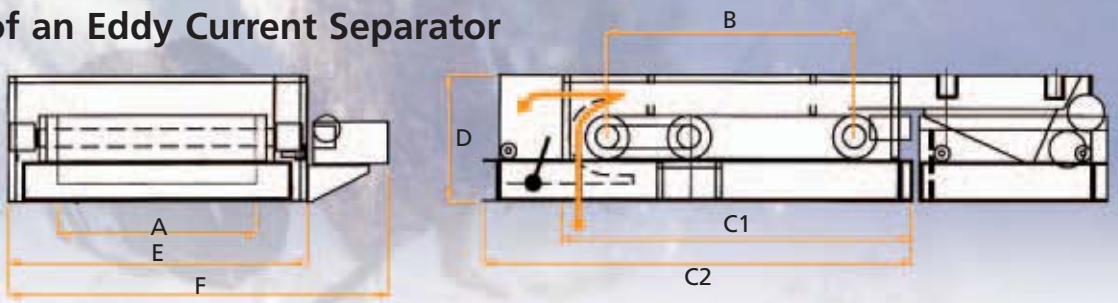
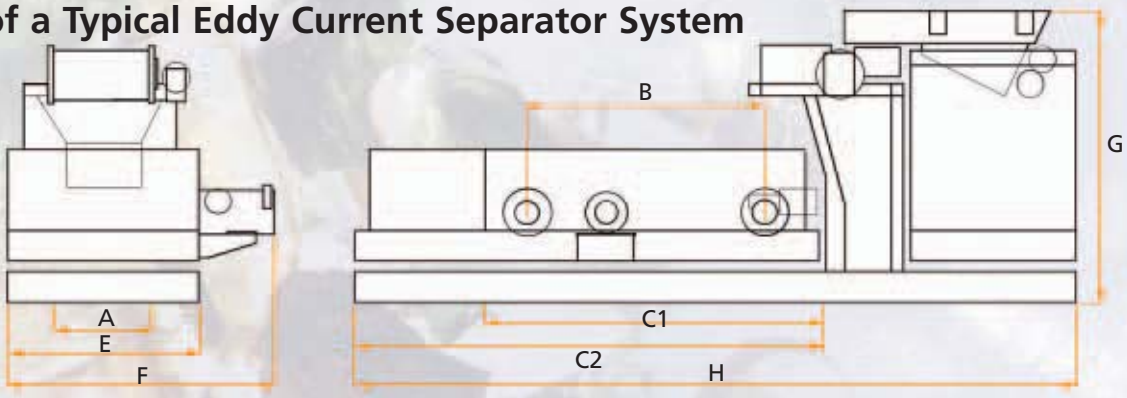


Diagram of a Typical Eddy Current Separator System



ECS Model	Weight (kg)		Total Power belt with rotor drives		Feed Width	Distance between Pulleys	Length without hopper	Length with hopper	Height		Width	Width with motor	System height	System length
	NM	LC	NM	LC	A	B	C1	C2	NM D	LM D	E	F	G	H
12	400	450	7	6.25	305	1500	2110	2930	650	720	899	1330	1840	4120
16	565	700	7	6.25	406	1500	2110	2930	650	720	1000	1430	1840	4120
20	730	950	7	6.25	508	1500	2110	2930	650	720	1102	1530	1840	4120
24	895	1200	7	6.25	601	1500	2110	2930	650	720	1203	1630	1840	4120
28	1060	1450	7	6.25	705	1500	2110	2930	650	720	1305	1735	1840	4120
32	1225	1700	7	6.25	810	1500	2110	2930	650	720	1407	1840	1840	4120
36	1390	1950	7	6.25	915	1500	2110	2930	650	720	1508	1940	1840	4120
40	1555	2200	7	6.25	1015	1500	2110	2930	650	720	1610	2040	1840	4120
48	1875	2600	7	8.60	1212	1500	2110	2930	650	790	1812	2300	1840	5300
60	2275	3000	7	12.10	1500	1500	2110	2930	650	790	2118	2610	1840	5300
80	2900	-	7	-	2000	2500	3110	2930	700	-	2628	3120	1840	6300

Notes: 1 All dimensions are in mm, approximate and subject to confirmation at time of order.
2 ECS System typically includes a drum, a vibratory feeder and an ECS unit.

Capacity per 1000mm Feed width (Tonnes/hour)

Glass Cullet	-40mm	20.0
Car frag	-12mm	5.2
Car frag	12-30mm	12.5
Car frag	30-70mm	20.0
Shredded refuse	-50mm	18.0
Shredded refuse	50-150mm	20.0
Plastic Al	-10mm	0.9
Copper Pb	-8mm	0.9
Copper PVC	-6mm	2.25
Ash NF	-100mm	21.5
Sand NF	-100mm	20.0

For advice on individual applications, contact Eriez engineers at address left.

Eriez Magnetics Europe Limited
European Manufacturing, Design and Test Laboratory Headquarters
Bedwas House Industrial Estate,
Bedwas, Caerphilly CF83 8YG, UK

T: +44 (0)29 2086 8501
F: +44 (0)29 2085 1314
E: eriez@eriezeurope.co.uk
www.eriez.com

MANUFACTURING AFFILIATES IN:
AUSTRALIA BRAZIL CHINA INDIA JAPAN
MEXICO SOUTH AFRICA USA

Bath Design Centre 0707

APPENDIX D.15

WIND SEPARATOR UNIT

(2 pages)

NIHOT®

Nihot Windshifter

Solutions in air-controlled separation

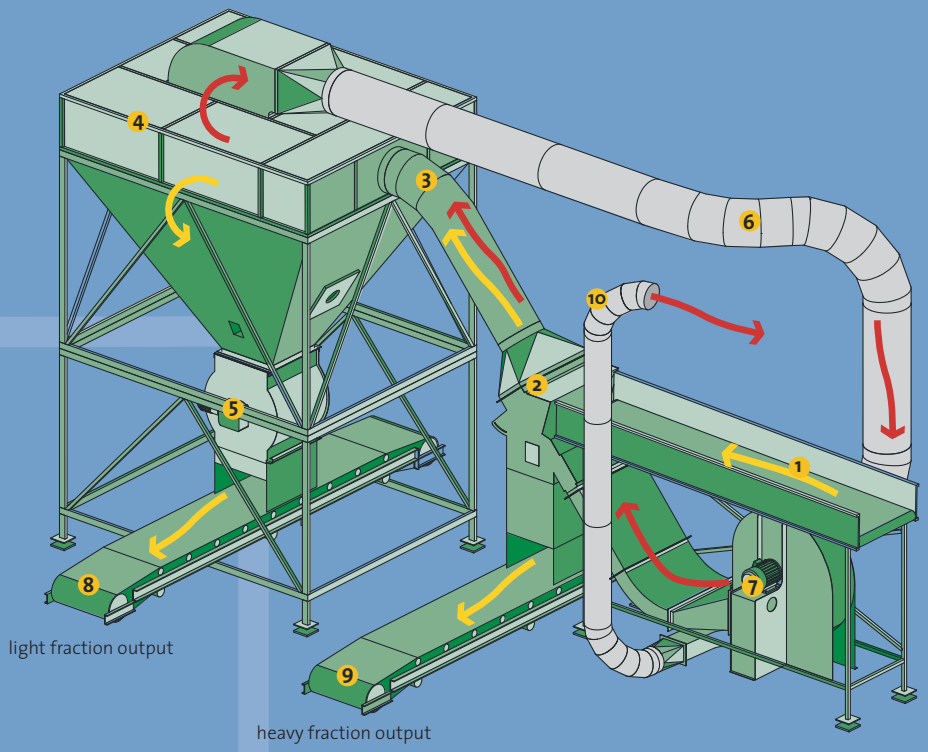
In waste processing, controlled air is a perfect separation medium, both in terms of process technology and business solutions. Controlled air is one of the core technologies of Nihot. It is versatile, offers greater flexibility than mechanical separation technologies and it guarantees high separation efficiency. By using air, materials can be separated based on both material density and shape. Nihot, has optimized air technology for waste separation. The company is a recognized key player in its field.

The Windshifter is a combination of a recirculation fan, a separation unit (diagonal shifter, vertical shifter or zig-zag shifter) and a combi separator. It is the best separating solution based on density of the material at capacities up to 100 tonnes/hr. The low-maintenance Windshifter is a proprietary design of Nihot. It offers effective separation and operational reliability, with a proven and long track record at customer plants worldwide.

- Windshifters
- Drum Separators
- Industrial Dust Suppression

Airflow (red) and materials (yellow)

1. Product Input Conveyor (PIC)
2. Windshifter
3. Material transportducting
4. Combi Separator
5. Rotary Valve
6. Air return Ducting
7. Recirculation Fan
8. Light fraction Conveyor
9. Heavy fraction Conveyor
10. Exhaust air to Filter-Unit.



Types/performance

The Windshifter is standarized , and can be supplied with an met een effective width of 500mm to 2000mm.

We recognize the following types.

- WS-S: separation unit is diagonal shifter.
- WS-V: separation unit is vertical shifter.
- WS-Z: separation unit is zig-zag shifter.
- Processes input of up to 100 tonnes/hr into two fractions, heavy and light.
- Processes fraction sizes of 20 - 400mm.
- Stable, reliable separation system.
- Separation efficiency up to 99 wt.%.
- Low dust emission due to controled circular airflow.

Benefits USP

- Proven high operational reliability, i.e. increase of effective production time.
- High separation efficiency – up to 99 wt.%.
- Gives control of the calorific value of the output.
- Removes interferants from input, thus protecting the granulators in RDF refinement.
- Low maintenance and very few wearable parts, i.e. reduced downtime, low operational costs.
- Low dust emission.

These benefits result in fast return on investment, low operating costs and superior reliability.

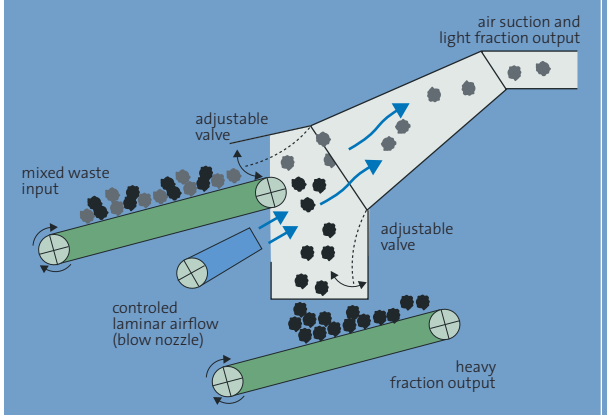
Applications

The Windshifter is utilized for the separation and/or upgrading of the following Waste qualities.

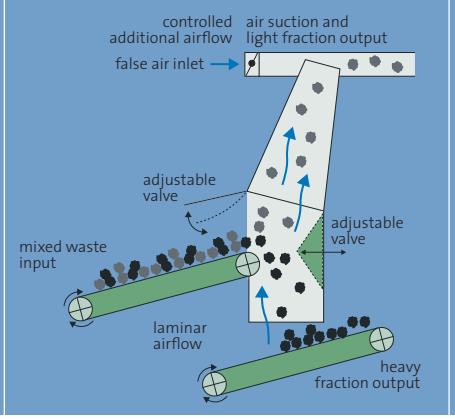
- Municipal Solid Waste. (MSW).
- Commercial and Industrial Waste (C&I).
- Construction and Demolition Waste (C&D).
- Compost Refinement section.
- Waste from Electric and Electronic Equipment (WEEE).
- Biomass/Wood recycling.
- Refuse Derived Fuel (RDF).
- Bottom Ash Upgrading.
- Single Stream (DSD/PMD).

Separation units of Windshifter

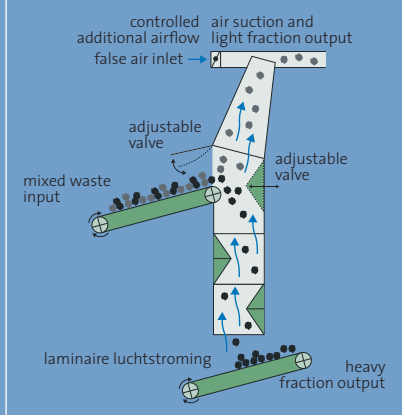
WS-S: Diagonal shifter



WS-V: Vertical shifter



WS-Z: Zig-zag shifter



NIHOT®
Nihot Recycling Technology B.V.
Generatorstraat 16, NL-1014 AT Amsterdam, PO Box. 20524, NL- 1001 NM Amsterdam
Tel: +31 (0) 20 58 220 30, Fax: +31 (0) 20 58 220 39

APPENDIX D.16

FINAL SHREDDER

(8 pages)

UNTHA

shredding technology

The reliable brand!

TR SERIES

TR2000, TR2500, TR3200

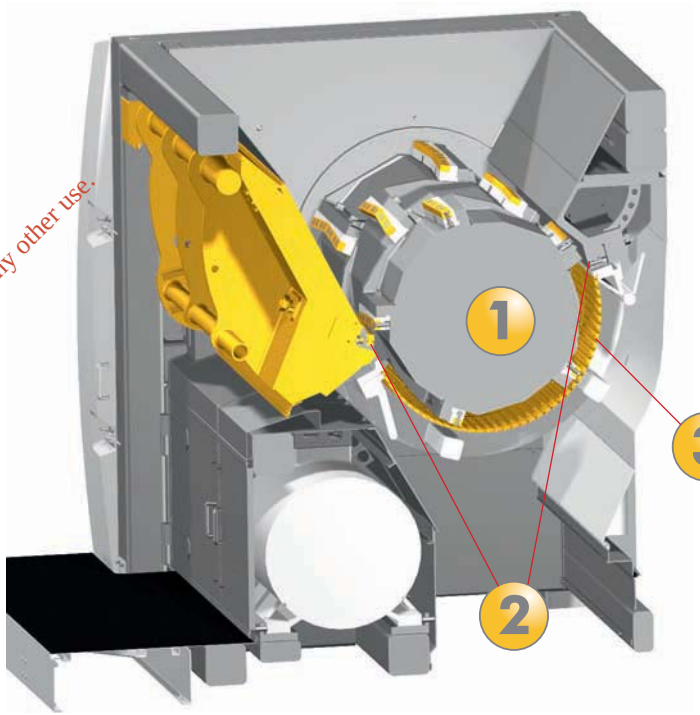
TR SERIES

The reliable and powerful TR series has been specifically developed for the post-shredding of the fraction of high calorific value and is mainly used in the preparation of secondary fuels.

With its high uptime and enormous throughput, the TR series is among the most profitable post-shredding equipment. Some highlights among the many quality features are the quick-change cutting system, the highly effective protection from foreign matter and the low operating costs.

FUNCTION AND DESIGN

Thanks to the huge diameter of the rotor and the specific geometry of the shredder casing, the rotor (1) is able to pull in the material independently and the material is pressed against the cutting bars (2) and shredded. The perforated screen (3) determines the size of the final fragments.



A SELECTION OF IMPLEMENTED APPLICATIONS

- Treated household waste • Treated industrial and commercial waste • Bales of pre-shredded plastics
- Pre-shredded plastic film • Plastic waste from vehicle dismantling • Pre-shredded waste from the plastics industry
- Packaging materials • etc.

QUALITY FEATURES

High availability

- Uptime increased by up to 10% thanks to quick-change cutting system (A) (5,000 t/ year in two-shift operation)
- Effective protection from foreign matter: the gate (B) opens automatically and the drive train is secured by means of a shear-pin coupling.
- Simple and therefore highly failsafe drive concept (C) with single-step timing belt drive without gear

Low operating costs

- No ram required
- Energy-efficient drive system (timing belt drive without gear)
- Long service life thanks to 4-fold rotatability of the indexable inserts (D) and stator blades
- Low maintenance costs thanks to short downtime for replacing the cutters, long maintenance intervals and automatic central lubrication system

High throughput

- Extremely high uptime
- Very large rotor diameter (1,100mm) – hence larger screen surface
- Frequency inverter for infinite speed adjustment

Simple operation

- SRC[1] panel with integrated 5.6" touch screen and high resolution colour display (simple menu navigation)

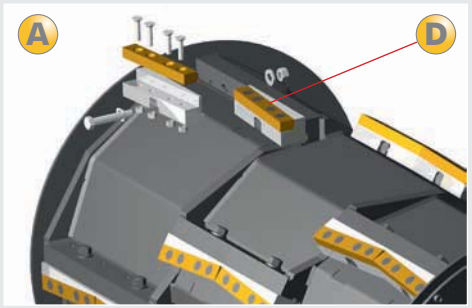
Robust, straight-forward design

- Steel frame structure (E) made from warp-resistant and solid special section tubes for heavy duty applications and low-vibration running
- Frame structure makes compact design possible – small footprint
- All machine components are easily accessible via maintenance gates; no tools needed to open them
- Integrated noise reduction system (F) to reduce noise emissions by 5-10 dBA

Options

- Ventilation system to protect the components from dust and contamination
- Discharge belt for swift and safe discharge of material; thanks to the belt, the machine can be set up directly on the floor; no additional steel structures or frames required
- Attachable hopper
- SRC(E)[2] panel with 15" touch screen for even more ease of operation
- **„UNTHA carefree package"**

1) Safety remote control
2) Safety remote control (expert)



A SELECTION OF IMPLEMENTED POST-SHREDDING PROJECTS

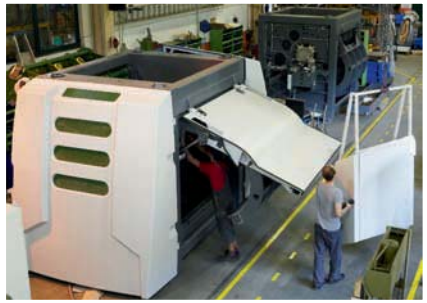
Application: Household waste
Solution: TR3200
Location: Ireland

Application: Industrial and commercial waste
Solution: TR3200
Location: Great Britain

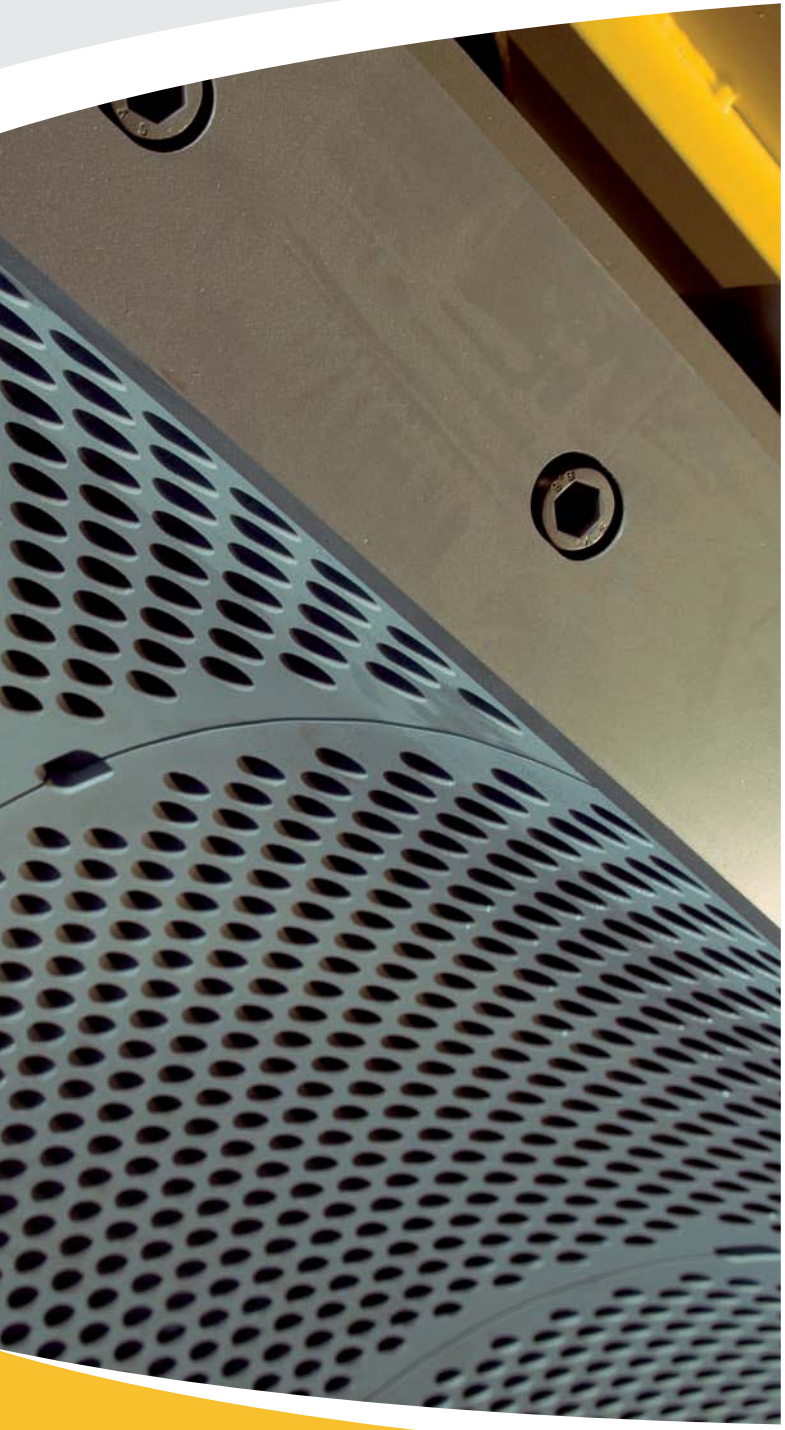
Application: Industrial and commercial waste
Solution: TR2500
Location: Austria

Application: Household waste
Solution: TR2500
Location: Austria

Application: Industrial and commercial waste
Solution: TR3200
Location: Ireland



Application: Household and commercial waste
Solution: TR2000
Location: Great Britain



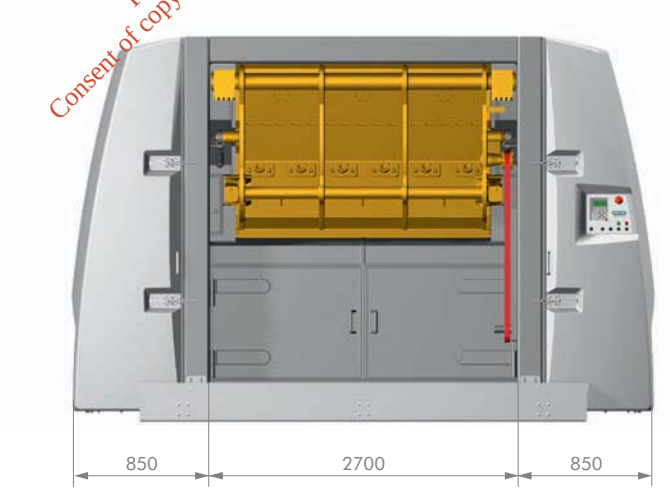
TR SERIES

Single-shaft shredding system

TECHNICAL DATA		TR2000	TR2500	TR3200
Driving power	kW	200	250	315
Hydraulic power	kW	3,5	3,5	3,5
Ø Rotor	mm	1.100	1.100	1.100
Rotor speed	rpm	140	140	175
Weight	kg	ca. 20.000	ca. 22.000	ca. 24.000
Throughput*	kg/h	up to 9.000	up to 12.000	up to 15.000

*) depending on: quality of material and diameter of perforated screen

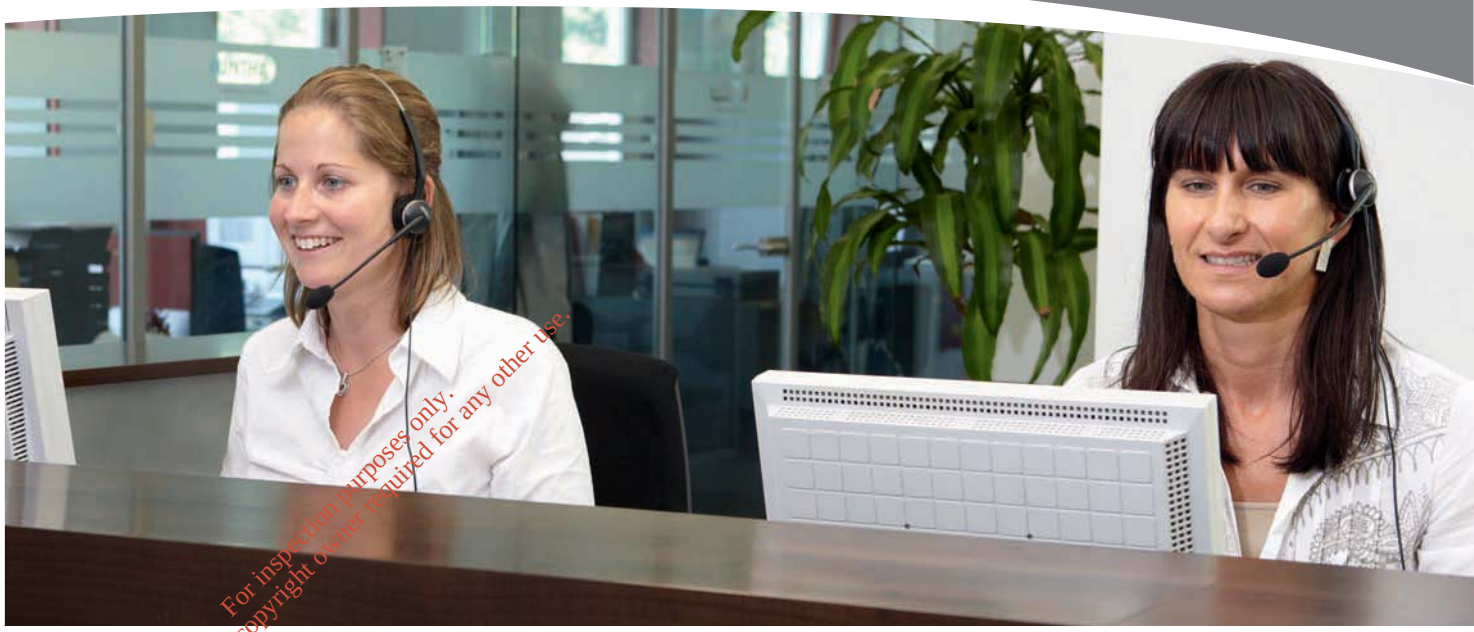
All dimensions in mm.



UNTHA

shredding technology

The reliable brand!



UNTHA shredding technology

Moldanstraße 141
A-5431 Kuchl / Salzburg, Austria
Tel +43 6244 7016 0, Fax +43 6244 7016 1
info@untha.com

www.untha.com

Authorised partner of UNTHA

APPENDIX D.17

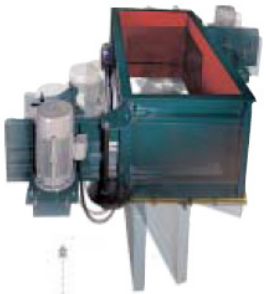
BALING PRESS

(2 pages)

GB SERIES

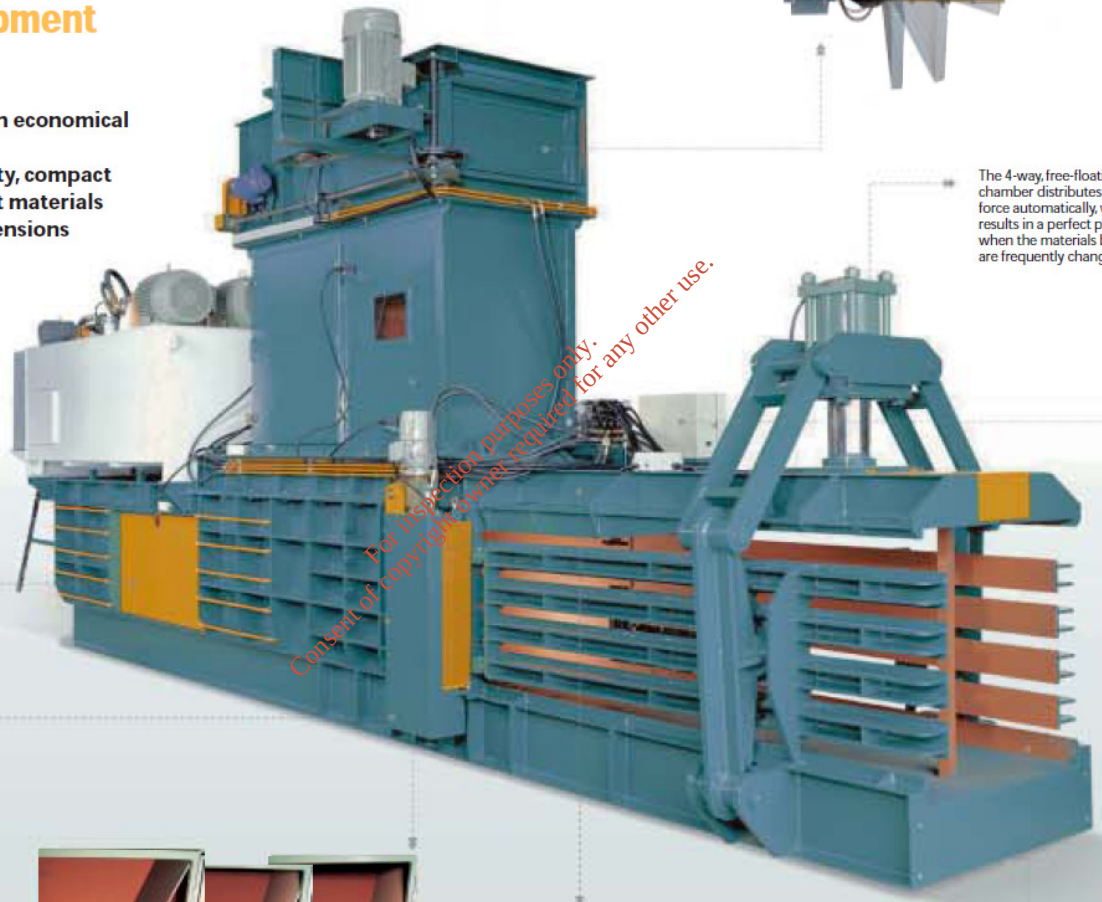
Professional Recycling Equipment
Automatic Baling Press

These automatic baling presses are the ultimate in economical and ecologically responsible waste disposal.
The waste material is compressed into high density, compact bales, which have been tailored specifically to suit materials handling equipment and shipping container dimensions



• Optional

An optional fluffer device is available, which is designed to evenly distribute newspapers, magazines and books in order to increase the compaction density of the bale.



The 4-way, free-floating chamber distributes the ram force automatically, which results in a perfect performance when the materials being baled are frequently changed.

This functional diagram with fault locating device ensures ease of operation and simple maintenance.

The trunnion-mounted main cylinder is supported by a ball-end joint. This has been specifically designed to avoid stress to the rod of the cylinder, the ram and the structure of the baler, resulting in a longer life for the seals and packing rings, which reduces maintenance.

The professional control panel acts as the diagnostic, monitoring and troubleshooting interface, with easy to set operational parameters for varying materials. In order to change products, an operational switch has been fitted for the purpose of selecting optimum settings.

The exclusive auto-tier system increases the speed of bale tying, consequently increasing production. This simplistic and easily accessed structure provides an optimal solution, which requires minimal cleaning and maintenance.

This machine meets all OSH requirements and is CE Certified.

The hopper opening and chute can be altered to suit any material diversity. A large opening would be more suitable for large corrugated board, whereas a smaller aperture provides an easier solution for shearing materials which are dense and more difficult to separate.

The unique shear cutter cuts off the material at different steps, thus reducing the amount of energy required to separate the product at the chamber entry. This feature increases efficiency and life-span for many baler parts.

Anti-reverse clapper devices prevent hard memory materials from reversing back into the baler chamber, thus producing greater efficiency and density, resulting in a good square bale.

Godswill offer a complete range of baling machines to suit the diverse requirements of each customer. From installation to capacity, these machines have been built from outstanding designs and over 20 years of experience, resulting in the finest possible solution for your waste needs.


GB-7575FS Indonesia


GB-7575F Malaysia


GB-7575F UK


GB-1108F Iceland


GB-1111F Australia


▲ GB-0505F


▲ GB-7575F
GB-7575F-1502


▲ GB-7575FL-II


◀ GBP-7511C


GB-1111F Japan


GB-1111F Taiwan


GBP-7511C UK


GB-1111F Ireland


GB-1111F New Zealand


▲ GB-1108F

APPENDIX D.18

DRYER

(2 pages)

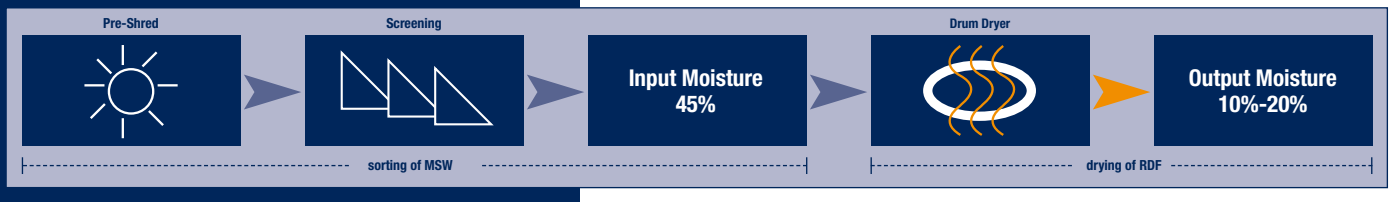
REFUSE DERIVED FUEL

Vandenbroek International is a worldwide provider of turn-key dryer installations, with broad experience in the drying of many kinds of products. Over the years, the Vandenbroek Thermo-Kinetic Drum dryer has proven to be a reliable concept.

MSW processing plant

WASTE TO ENERGY WITH REFUSE DERIVED FUEL (RDF)

Due to changing environmental legislation and the need for alternative fuels, new designs for mechanical and biological treatment of solid waste are being developed all over the world. Refuse-Derived Fuel (RDF) is an alternative fuel produced by shredding, sorting and dehydrating the light fraction of the Municipal Solid Waste (MSW). The objective of this concept is to obtain high-calorific and stable material. These fuels can replace fossil fuels in many applications, such as power or cement kiln plants. An RDF process basically comprises the following steps:



SORTING OF MSW

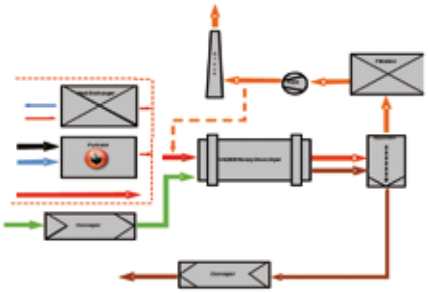
Mechanical separation of the waste flow in a high and low-calorific fraction. This process involves pre-shredding, screening and classifying the waste material. Metals are taken out and a high-calorific (wet) light fraction product (RDF) remains.

VANDENBROEK International

www.vadeb.com

when drying is part of your business

1. DRYING OF RDF



The wet product is dried with preheated air, where the heating unit is placed in front of the rotary drum. The heat source can be a (bio)gas or (bio)fuel-fired furnace, or alternatively comes from an external (waste) heat source. The heat (e.g. flue gas from power generators) can pass either directly or indirectly (through heat exchangers) into the drum. The heated air flows into the rotary drum within a temperature range of 230-300°C. **VADEB**® Thermal Kinetic Technology is characterised by a turbulent rinsing of the wet product with the hot air flow. This is done by a multi-dimensional, spiral-shaped passage of air and wet product flow through the drum, the so-called 'Multi-Pass-System'. A dried product with a moisture content as per client request remains (10%-20%). The process air can be cleaned of dust by cyclones and/or filters. Moisture can be reduced by condensers or scrubbers and odours can be removed by chemical scrubbers, biofilters or Regenerative Thermal Oxidizers (RTO).

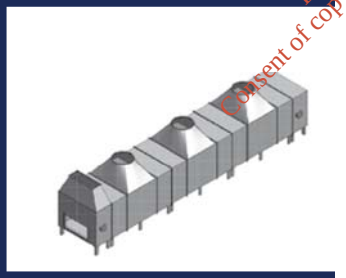
Irrespective of the heat source – be it fossil fuel, biomass or waste heat – the Thermal Kinetic Technology allows **VADEB**® to create the best thermal efficiency for the drying system. As a result, the alternative fuels can be produced at minimum cost and with consistent quality. **VADEB**® RDF dryers are available as drum or belt dryers in capacities up to 30,000 litres per hour of water evaporation.

VADEB® DDD

With the **D**irect **D**rying **D**rum system the product is **directly heated**, i.e. the hot air flows directly into the rotating drum. The air is heated in a furnace, burning fossil or biofuels, or comes direct as flue gas from a gasmotor or -turbine. The DDD system is very flexible in terms of permissible variation in inlet temperature. By recycling a part of the process air to the dryer, the efficiency is improved and the amount of airborne gas to the stack is considerably reduced.

VADEB® IDD

In the **I**ndirect **D**rum **D**rying system the process air is **indirectly heated** using a heat exchanger. In this case the recirculation of process air is up to 95%, resulting in lower energy consumption. The indirect type of heat transfer makes the IDD dryer ideal for applications where waste heat is available in the form of steam, or flue gas from gasmotors or -turbines.



VADEB® BD

Direct or Indirect Belt Drying solutions for low temperature applications in the range from 90 – 180°C. The woven steel belt does not require maintenance and keeps overall electrical power consumption low. Due to the modular design the **VADEB**® belt dryer is well-suited to all manner of applications.

VANDENBROEK
Thermal Processing B.V.
Albert Plesmanstraat 2
3772 MN Barneveld
The Netherlands

Phone +31 (0)342 40 42 40
Fax +31 (0)342 40 42 41

Email info@vadeb.com
http www.vadeb.com

All **VADEB** RDF dryers can be supplied with automatic process control allowing easy operation of all parameters

VANDENBROEK International

a company within the Environment division of **Stibbe Management**

www.vadeb.com
when drying is part of your business

APPENDIX D.19

REGENERATIVE THERMAL OXIDISER

(1 page)

Environmental Integrated Solutions

EIS, a division of the Intergroup of companies based in Rochdale, is a dynamic company which has rapidly become globally competitive while at the same time responsive to the demands of the European market.

The philosophy for the growth of the company is based on a partnership with both existing and new customers. This partnership allows EIS to provide individually designed VOC and odour abatement systems which fully integrate with existing processes and comply with individual authorisation emission levels.

The available technology includes:-

- Thermal Oxidisers
- Catalytic Oxidisers
- Adsorption Systems
- Absorption Systems
- Heat Recovery Systems
- Filtration Systems

The workforce numbers thirty, made up of chemical, mechanical and electrical engineers, supported by a comprehensive team of qualified installation, commissioning and service engineers. Post sales service support includes training, both practical and theory, together with service contracts to suit the need of the individual company.

To maintain our commitment to quality, our project managers will ensure that each installation is engineered correctly, installed and completed to the agreed delivery schedule.

Once installed, our service engineers will carry out the final start-up and commissioning of the equipment to ensure full integration with the production process and compliance with the emission authorisation, prior to handover to the client.

Regenerative Thermal Oxidisers

Regenerative Thermal Oxidisers or RTOs are the preferred technology for the abatement of manufacturing processes with a wide range of VOC concentrations and process exhaust volumes.

EIS offer a range of RTOs including single, double and multi canister units, the choice of which is dependant on the process condition and emission limits. Depending on the solvent concentration, each system can be designed for a thermal efficiency of 95% or more, to minimise the use of support fuel. At the design thermal efficiency and at an achieved solvent loading the RTO will be autothermal, No Flame Operation.

Heat recovery is achieved by using ceramic media in random or structured design in each of the canisters on a cyclic basis to alternatively recover heat from the high temperature exhaust gases as they exit from the RTO or to preheat the incoming process exhausts as they enter.

The destruction of the VOCs is ensured by use of the three "Ts," Turbulence, Temperature and Time. Turbulence is achieved by the incoming exhaust stream passing through the randomly packed ceramic media into the combustion chamber. Temperature is the design temperature in the combustion chamber, typically 800°C or 1200°C for chlorinated compounds. Time, is how long the process gases are held in the combustion chamber to achieve destruction.

This high level of destruction is then maintained by careful selection of operating cycle time, inlet and outlet damper design and the use of a purge system.

The destruction efficiency of the RTO can be further enhanced by the use of twin seal dampers to minimise the possibility of cross contamination. To accommodate exhaust streams with high solvent loadings high solvent bypasses are available.

APPENDIX D.20

LABORATORY ANALYSIS RESULTS - CHAR

(2 pages)

Marchwood Scientific Services

Unit 4G Marchwood
Industrial Park,
Marchwood,
Southampton, Hants,
SO40 4PB

Tel: 02380-669126
Fax: 02380-669127

Catalyst Environmental Ltd
Unit 18 Tallaght Business Centre
Whitestown Business Park
Tallaght
Dublin 24

Certificate No.	112/45 Page 1 of 2
Date received	03.01.12
Ref.	CAT/112/45

17th January 2012

Re. Analysis of a Sample Ref. CDU-0060-R1/Char for a Range of Determinands-

Please find below the tabulated results for the sample received, (AR = as received; D = dry basis; DAF = dry ash-free basis)

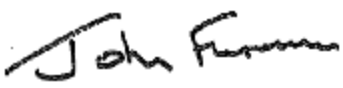
Results- Sample Ref. CDU-0060-R1/Char-

Determinand	Units	AR	D	DAF	Method
Loose Bulk Density	Kg/m^3	1241	-		CEN/TS 15401
Gross CV	KJ/Kg	15907			CEN/TS 15400
Net CV	KJ/Kg	14780		-	CEN/TS 15400
Proximate Analysis					
Moisture	% w/w	1.9		-	CEN/TS 15414
Ash	% w/w	50.2	51.2	-	CEN/TS 15403
Volatile Matter	% w/w	7.3	7.4	14.9	CEN/TS 15418
Fixed Carbon	% w/w	35.4	41.4	85.1	Calculation
Total	% w/w	100.0	100.0	100.0	
Ultimate Analysis					
Sulphur	% w/w	2.5	2.6	5.1	CEN/TS 15407
Carbon	% w/w	36.6	36.2	74.9	CEN/TS 15407
Hydrogen	% w/w	5.0	5.1	10.2	CEN/TS 15407
Nitrogen	% w/w	0.3	0.3	0.6	CEN/TS 15407
Chlorine	% w/w	2.5	2.6	5.1	CEN/TS 15408
Oxygen	% w/w	2.0	2.0	4.1	Calculation
Total#	% w/w	100.0	100.0	100.0	

(includes ash and moisture)

(cont.)

Determinand	Units	AR	Method
Metals			
Mercury	mg/Kg	<0.1	CEN/TS 15411
Cadmium	mg/Kg	24	CEN/TS 15411
Thallium	mg/Kg	<1	CEN/TS 15411
Antimony	mg/Kg	109	CEN/TS 15411
Arsenic	mg/Kg	10	CEN/TS 15411
Chromium	mg/Kg	775	CEN/TS 15411
Cobalt	mg/Kg	21	CEN/TS 15411
Copper	mg/Kg	1629	CEN/TS 15411
Lead	mg/Kg	1422	CEN/TS 15411
Manganese	mg/Kg	1093	CEN/TS 15411
Nickel	mg/Kg	471	CEN/TS 15411
Tin	mg/Kg	103	CEN/TS 15411
Vanadium	mg/Kg	47	CEN/TS 15411
Halides			
Chloride	% w/w	2.5	CEN/TS 15408
Bromide	% w/w	<0.01	CEN/TS 15408
Fluoride	% w/w	<0.01	CEN/TS 15408
Iodide	% w/w	<0.01	CEN/TS 15408
% Biomass (Dry Basis)	% w/w	<1	CEN/TS 15440
% Non-Biomass (Dry Basis)	% w/w	49.6	CEN/TS 15440
% Inert Mass (Dry Basis)	% w/w	50.4	CEN/TS 15440



……
J.Fursman
For/on behalf of Marchwood Scientific Services Ltd

APPENDIX D.21

LABORATORY ANALYSIS RESULTS - SLAG

(1 page)

Customer:	Catalyst Environmental Limited
Sample ID:	CEK-0454-R1/Slag
Moisture Content (% w/w)	0
Mass of raw test portion (MW) kg	0.175
Mass of dried test portion (MD) kg	0.175
Moisture content ratio (MC) %	0
Dry matter content ratio (DR) %	100
Leachant volume (1) (L2) l	0.350
Leachant volume (2) (L8) l	1.400
Eluate Volume (1) (VE1) l	0.341
Eluate Volume (2) (VE2) l	1.357

Eluate Analysis	Conc. In Eluate			
Liquid : Solid Ratio	2:1	8:1		
pH (units)	9.68	9.75	Amount Leached	
Temperature (°C)	20	20		
Conductivity (µS/cm)	205	95	2:1	10:1
Determinand	mg/l	mg/l	mg/kg	mg/kg
Arsenic	<0.03	<0.03	<0.06	<0.30
Cadmium	<0.001	<0.001	<0.002	<0.010
Chromium	<0.001	<0.001	<0.002	<0.010
Cobalt	<0.001	<0.001	<0.002	<0.010
Copper	<0.004	<0.004	<0.008	<0.04
Manganese	<0.001	<0.001	<0.002	<0.010
Mercury	<0.001	<0.001	<0.002	<0.010
Nickel	<0.003	<0.003	<0.006	<0.03
Lead	<0.009	<0.009	<0.018	<0.09
Antimony	<0.03	<0.03	<0.06	<0.30
Thallium	<0.01	<0.01	<0.02	<0.10
Vanadium	<0.002	<0.002	<0.004	<0.020
Zinc	<0.02	<0.02	<0.04	<0.20
Chloride	21	1	42	49
Fluoride	<0.03	<0.03	<0.06	<0.30
Sulphate	22	3	45	68
Total Dissolved Solids	137	64	275	780

Marchwood Scientific Services
Registered in England No. 03604766
Registered Office: Unit 4G Central Crescent, Marchwood Industrial Park, Marchwood, Southampton, Hants, SO40 4PB.