ANEXO III PROVEEDORES DE EQUIPO

TRITURADORES

Trituradores Industriales

Los trituradores BANO, están pensados para la trituración y molido de desechos industriales resultantes de los procesos productivos de las empresas.

Asimismo, ofrecen soluciones definitivas a empresas gestoras de residuos industriales, para reducir el tamaño de los desechos y permitir además una separación más fácil de los componentes de diferente naturaleza, facilitando, de esta manera, los procesos de recuperación posteriores. Todos los equipos pueden ser adaptados a las exigencias particulares de cada cliente, pudiendo ofrecer así la máxima flexibilidad adaptabilidad en cada caso concreto.

Ventajas:

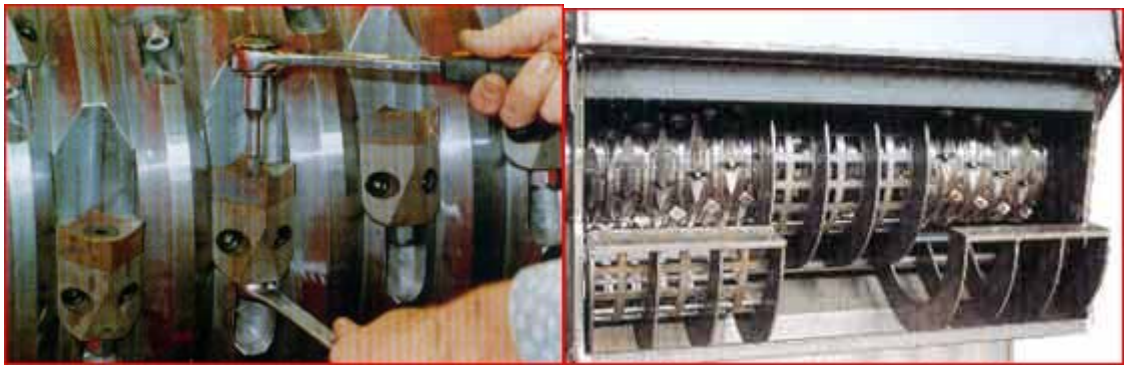
- Motores de diversa potencia desde 20HP a 400 HP (15 a 300 kW)
- Elementos de corte de diferentes formas, según el tipo de trabajo requerido.
- Sistema exclusivo de fijación de los elementos de corte, que permite un rápido cambio, en caso de desgaste o rotura.
- Rápido y sencillo mantenimiento de la instalación.

Aplicaciones:

- Rápido y sencillo mantenimiento de la instalación.
- Desechos industriales como:
    - R.S.U.
- Tratamiento composta
    - Films (PE, PP, etc) Mat. Embalaje
    - Plásticos (PET, PVC, ABS, etc.)
    - Residuos extrusionadoras

- Piel
- Caucho
- Papel
- Espumas
- Maderas y palets
- Cables eléctricos
- Electrodomésticos
- Cintas de video y AudioEtc..

Triturador Unimac 1800



Sistema de cuchillas patentado por esta compañía

Trituradores SG

Trituradores SG Trituradores de **cuatro ejes** con motores eléctricos o hidráulicos. Los ejes y las cuchillas se realizan con aceros especiales que garantizan, gracias a un proyecto exclusivo, desgastes sensiblemente reducidos.

Pueden ser utilizados como pre-terminadores incluso con materiales ferrosos. En especial, debido a la gran robustez y potencia, su empleo ideal es en la tripulación de materiales particularmente resistente como neumáticos de camión, frigoríficos, traviesas, tubos de polietileno, etcétera.

Triturador de 4 ejes

Trituradores SP

Trituradores SP Trituradores de dos ejes con motores eléctricos o hidráulicos. Los ejes y las cuchillas se realizan con aceros especiales de alta resistencia. Indicados para el desbastado y la reducción volumétrica de cualquier tipo de material. La amplia gama presenta máquinas que sirven para cualquier exigencia como de los que permiten volúmenes de trabajo variables desde un mínimo de 5q/h hasta un máximo de 15t/h.

Triturador de dos ejes

Contámos con **TRITURADORES** especiales para satisfacer sus necesidades de destrucción, el tipo y modelo de triturador que usted necesita se selecciona en base al tipo de desperdicio que usted maneja y al tamaño final deseado después del proceso de trituración. Una de las aplicaciones mas comúnes para la utilización de nuestros trituradores es para destruir los productos (SCRAP) que no han cumplido con las normas de calidad, que se encuentran golpeados o caducados, asi usted tendrá un muy buen control del desperdicio que genera su empresa y evitando que se le dé un mal uso a sus productos.

Fuente: (http://marathon-equipment .com/RTG.htm)

Trituradores de Llantas.

Fuente: http://www.reductionsolutions.com/

ROTARY RECYCLER

Equipo ideal para procesar botellas PET y látas de aluminio. El Rotary Recycler® reduce el volúmen de los envases a través de una serie de discos que aplastan y perforan el envase, obteniendo al menos un radio de compactación del envase de 2.5 a 1!, Equipo ideal para precompactar sus envases Pet y de aluminio, reduciendo su volúmen y preparándolos para compactarlos y para formar pacas. Una de sus aplicaciones comúnes, son para dejar inservibles los productos ya caducados o con defectos de fabricación.

AUG JET

El Aug Jet combinado con un contenedor es un equipo ideal para lograr máximos niveles de compactación de desperdicios sólidos, incrementando las utilidades y reduciendo los gastos, puesto que destruye desperdicios de grandes volúmenes antes de ser compactados. Cuenta con un pistón de 18" de alta penetración. Operado por medio de un interruptor de llave para evitar el uso a personal no autorizado.

Fuente: (http://www.marathon-equipment.com/augjet.htm)

PRECRUSHER

Comprime tambores, muebles, y desperdicio en general a una fracción de su tamaño original. Cada ciclo del pistón hidráulico aplasta el material que se encuentra dentro de la boca de alimentación del Precrusher por medio de una

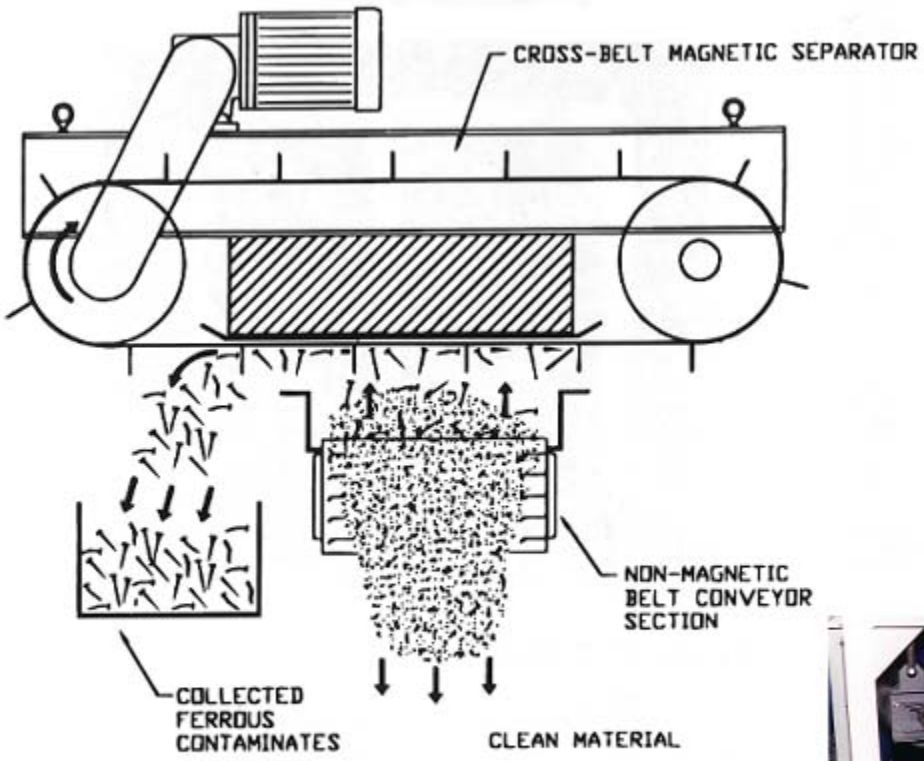
cabeza sólida de empuje. Altos radios de compactación se pueden lograr al eliminar el espacio hueco que existe en los materiales.

Fuente: (http://www.marathon-equipment.com/precrush.htm)

Los materiales compactados son muy fáciles de manejar, ya que se reducen a una mínima parte de su tamaño original. Una de las aplicaciones típicas del Precrusher es para compactar tambores de 200 litros, tarimas, y muebles, por lo cuál sus tambores, muebles y pallets ya no ocuparán un espacio valioso en su empresa.

Fuente: (http://www.marathon-equipment.com/precrush.htm)

SEPARADORES MAGNÉTICOS



Fuente: (http://www.vecoplanllc.com/Conveyors/RMH/rmhmagnetdiagflash.html)

Manual and Self-Cleaning Models

Permanent, manual and self-cleaning separator magnets are suspended overhead magnets designed for removing ferrous steel and other magnetic materials from your burden during the crushing, screening and sorting processes. The magnet is of the permanent type so no power is required to operate it. Power is only needed on self-cleaning models to operate the belt.

Applications:

Wood & Plastic Recycling

Crushed or Broken Stone

Processing at MRF's

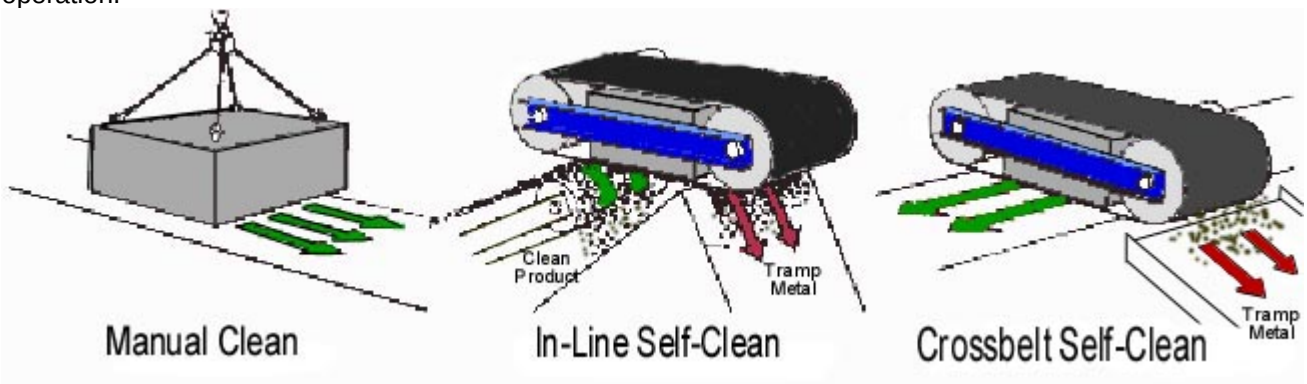
Pallet Recycling

Shredded Tire Processing

Self-Cleaning Model

Manual Cleaning Model

A heavy-duty neoprene belt, or optional Armor Clad belt, travels around the self-cleaning models and carries the ferrous material that is drawn upward, away and into the collecting hoppers or onto the ground. These units are typically installed either in-line or cross-belt (See diagram.) The manual cleaning models are cleaned by physically removing the debris or by using the optional stripper tray. These permanent separator magnets are designed to provide long-term, trouble free operation.



Specifications

Magnet:

- Exclusive magnetic circuitry
- High-grade Ceramic- 8A magnetic material
- Lifetime warranty on magnetic strength
- Complete stainless steel magnet housing
- Optional Swipe Arm for easy debris removal

Self-Cleaning Mechanism:

- TEFC 2 or 5 hp motor
- Heavy-duty 2 ply neoprene belt
- Precision crowned pulleys
- Tracking adjusters on tail pulley
- Optional *Armor-Clad* belt

Permanent magnets are available in a variety of sizes and strengths to fit many applications. Magnets are sized based on application evaluation. (i.e. belt width, belt speed, burden depth, size of recoverable ferrous.)

Call or fill out our *Application Data Sheet* for a prompt quote on the proper size magnet for your application.

IPES International, Inc.
319 Butler St., Pittsburgh, PA 15223
Phone: (412) 781-4660, Fax: (412) 781-4661
Email: ipesmag@aol.com

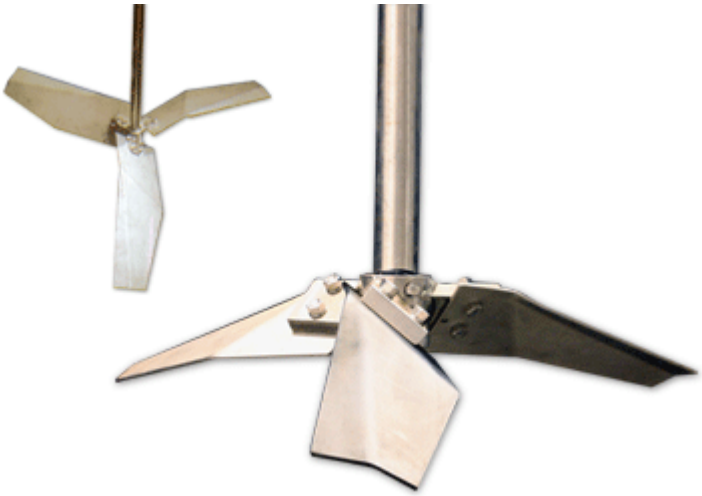
Industry Links

Fuente: (http://www.ipesmag.com/permanent.html)

AGITADORES.

Hydrofoil (LS)

Low Shear Hydrofoil for low viscosity mixing - Most flow-efficient low shear impeller available for low viscosity mixing (up to 2,500cp) - Primarily used in liquid blending and solid suspension application - 3LS39 has a power number of 0.30 and is most efficient - 4LS45 has a power number of 0.55 and is used where 3LS39 is too large in diameter - Patent Number 5,297,938



To find more about this product, simply call our office or one of the representatives you can find in our Rep Locator for your area.

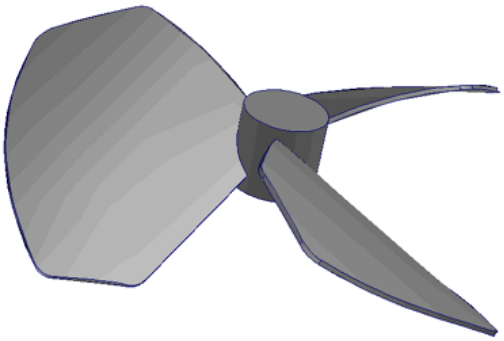
We are your partner in performance and we are dedicated to providing the best solutions to your mixing operation.

Fuente: (http://www.philadelphiamixers.com/product.asp?id=24&cat_id=8)

High Solidity Hydrofoil (HS)

Most flow-efficient impeller available for high viscosity mixing

- Most flow-efficient impeller available for high viscosity mixing (up to 2,500cp-100,000cp) and for high head applications (gas dispersion and draft tube) -



Characterized by its wide blade design - Primarily used in liquid blending and solid suspension application - The HS is the impeller of choice for gas dispersion where bottom flow velocities are also required (e.g. simultaneous gas dispersion and solids suspension). - Patent Number 5,326,226

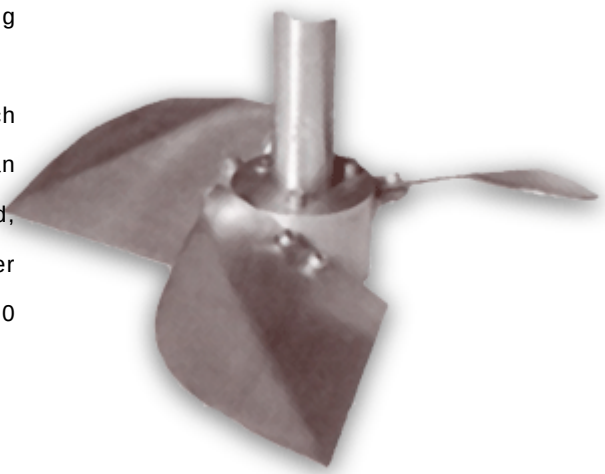
To find more about this product, simply call our office or one of the representatives you can find in our Rep Locator for your area.

We are your partner in performance and we are dedicated to providing the best solutions to your mixing operation.

Fuente: (http://www.philadelphiamixers.com/product.asp?id=26&cat_id=8)

Rounded Tip Medium Solidity Hydrofoil (RMHS)

Impeller of choice for medium viscosity mixing



- Impeller of choice for medium viscosity mixing (much like MHS) where high tip speed and abrasive solids can cause blade wear.- Characterized by its rounded, narrower blade design- 3RHMS39 has a power number of 0.50

To find more about this product, simply call our office or one of the representatives you can find in our Rep Locator for your area.

We are your partner in performance and we are dedicated to providing the best solutions to your mixing operation.

Fuente: (http://www.philadelphiamixers.com/product.asp?id=28&cat_id=8)

PV-2 Mixer Drive

Maximum efficiency, minimum maintenance, and long life all in a superior small mixer designed not to act like one.

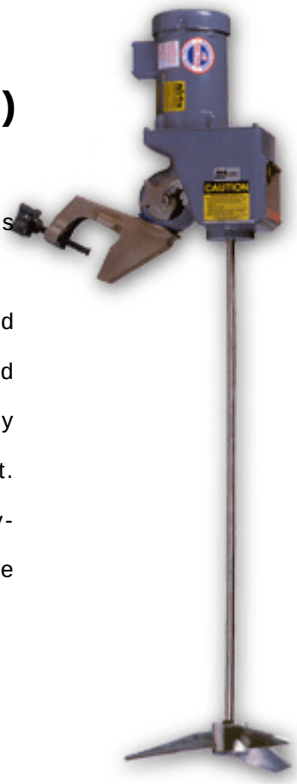
This small mixer was designed to give the operator everything they always wanted. Short delivery lead times, long life, lower maintenance costs, and high efficiency. Philadelphia Mixers designed it into the PV-2. This mixer can be customized to fit your unique mixing operation by utilizing standardized components and options. Rugged performance, longevity, and ease of maintenance make this the superior choice for smaller mixing operations.

To find more about this product, simply call our office or one of the representatives you can find in our Rep Locator for your area.

We are your partner in performance and we are dedicated to providing the best solutions to your mixing operation.

Fuente: (http://www.philadelphiamixers.com/product.asp?id=1&cat_id=1)

Portable Mixers (PD, PG, PSG, POG, PMG)



Portable mixers with the inside edge on your applications

Philadelphia Mixing Solutions offers one of the most comprehensive and complete lines of portable mixers to meet your application need and processing requirement. The corrosion resistant, cast aluminum alloy construction makes these mixers able to perform in any environment. Permanently lubricated O ring sealed gear chambers and life lubricated heavy-duty ball bearings provide years of dependable, worry-free, low maintenance service.

To find more about this product, simply call our office or one of the representatives you can find in our Rep Locator for your area.

We are your partner in performance and we are dedicated to providing the best solutions to your mixing operation.

Fuente: (http://www.philadelphiamixers.com/product.asp?id=11&cat_id=1)

Laboratory Mixing, Blending and Dispersion Equipment from Ross

For over 150 years Ross Mixers have been used in the Process Industries to manufacture adhesives chemicals, cosmetics, coatings, food products, pharmaceuticals, plastics and more. Our Laboratory mixers, blenders, dryers and dispersers are recognized worldwide as the standard of excellence.

Our lab size equipment is all available for predictable scale up to large production sizes. The Ross Test and Development facility is available in our Hauppauge New York facility, and can be used for trial lab mixes and production verification. You can leave our facilities knowing that what worked in the lab will also work in production.

Fuente: (http://www.lab-mixers.com/)

Ross Trial Rental Program

The Ross Trial Rental Program gives process managers a powerful tool for optimizing a process before committing to a large capital purchase. If you need mixing capacity to develop a new process or to verify a new production technique, for a week, a month or a year, or longer, we can help!

Once you've confirmed your mixing strategy and decided to purchase a new Ross mixer, a significant portion of your rental fees are creditied against the purchase price. That's smart mixing on any process line, and smart business on any balance sheet.

The Ross Trial Rental Program is supported with a solid commitment.

We stand behind our rental program with a commitment that guarantees fast action when you need it, and unbeatable mixing performance. With a multi-million dollar inventory of mixing equipment committed to the Ross Trial Rental Program, you can be sure that Ross will have the right mixer in stock when the need arises. If you need a mixer in a hurry, we'll ship it in a hurry--in most cases within 48 hours. Every class of Ross mixer is included in our Trial Rental Program.

Fuente: (http://www.mixers.com/rentals.asp)

Machinery & Equipment, Inc.

description:

MIXER, AGITATOR, LIGHTNING MODEL V5018. COMPLETE WITH 1/4 HP MOTOR, 3 PHASE, 60 HZ, 208-230/460V, 1725 RPM. BRISBANE, CA

Fuente:(http://www.machineryandequipment.com/Scripts/ShowDB.asp?PartNumber=S525950)

INTERCAMBIO IONICO

Fuente: (http://www.watersurplus.com/)

Surplus New & Used
Water Treatment Equipment

Watersurplus.com is the world's fastest growing buyer and reseller of surplus and refurbished used water and wastewater equipment and components. From RO housings, used filtration equipment, used pumps and used filter presses to surplus water storage tanks, water filtration, water purification equipment, water softeners, water conditioning and treatment equipment, Watersurplus.com has the necessary solutions for any of your water or wastewater process equipment applications.

Buying high quality water and wastewater fluid handling equipment saves our clients by cutting their project capital costs, reducing their start-up times and/or lowering their MRO costs.

Much of our refurbished used water and wastewater equipment can be shipped within two or three days, and half of our surplus inventory is new and in original packaging. We can supply entire high purity water plants, process equipment and water filtration vessels, controls and instrumentation as well as consumables such as ion exchange resin and reverse osmosis membranes.

Our engineering partners can design custom solutions for any of your water or wastewater process equipment applications.

We offer a full menu of investment recovery services including ongoing asset appraisals, liquidations, consignments and auctions.

Our Internet Inventory Listings represent only a portion of the items we currently have in stock. Call or e-mail us if you don't find what you're looking for. We'll find it for you, or refer you to one of our preferred vendors.

We put the plus in surplus by making sure our customers are 100% satisfied with our price, value, service and delivery on each and every transaction. Contact us today for more information on our RO housings, used filtration equipment, used pumps, used filter presses, water storage tanks, water filtration, water purification equipment, water softeners, water conditioning equipment, treatment equipment as well as learn how you can start saving now with the water and wastewater experts at Watersurplus.com.

John Barelli
President

Win a 50" Plasma TV

Sign up for Watersurplus.com Inventory Alerts and get entered to win a Pioneer 50" Plasma TV. Click here to enter.

Featured Items:

(Click on the Asset# to view item details)

Asset: REV1190151
Mfg: Ionics
Model: 320 GPM DOUBLE PASS RO
Qty: 1 ea.
Price: $270,000.00 ea.
BRACKISH RO UNIT

Asset: PUM1180460
Mfg: Goulds
Model: 3196 STX
Qty: 1 ea.
Price: $2,800.00 ea.
Centrifugal Pump 1.5 inch x 1 inch x 6 inch

Asset: REV1190154
Mfg: US Filter
Model: 150 GPM DOUBLE PASS RO
Qty: 2 ea.
Price: $150,000.00 ea.
Brackish RO UNIT

Surplus Management, Inc.
1100 Buchanan Street
Rockford, IL 61101
800.919.0888
815.636.8833
Fax: 815.636.8844
E-mail: sales@watersurplus.com

Fuente: (http://www.watersurplus.com/)

LENNTECH

Selective cation ion-exchange for the removal of heavy metals

Selective cation ion-exchange for the removal of heavy metals from solutions

Carbion - The selective ion exchanger made from natural material

Carbion **removes dissolved metals** and opens new applications for cationic ion exchangers.
Carbion is produced on the basis of wood, which is modified via a patented process.
The modifications show in the fact that Carbion does not float and does not burn.

The exceptional properties are:

- Complete adsorption capacity even in with oil, solvents and oxidising agents contaminated waste streams.
- Very effective removal of Chromium, Barium, Tin, Lead, radioactive components (e.g. Uranium), cationic surfactants and cationic dyes.
- Very effective even at low concentration of pollutants.
- It can be used in existing ion exchangers, without modifications of the system.
- The ion exchanger resin is shipped ready for use.

Carbion is hardened during the production process, which gives a mechanical and chemical stable granulate.

Identical to all known **selective ion exchangers**, Carbion can be regenerated with diluted acids and conditioned with diluted caustic soda.

Please feel free to contact us for any other water treatment issues and ion exchange applications. We will always provide you with extra information and reply to any water problems and questions sent to us.

Rotterdamseweg 402 M
2629 HH Delft, The Netherlands
tel: (+31)(0)15 26.10.900
fax: (+31)(0)15 26.16.289
e-mail: info@lenntech.com

Fuente: (http://www.lenntech.com/selective-ion-exchange-heavy-metals.htm)

RESINAS DE INTERCAMBIO IÓNICO

REMCO ENGINEERING WATER SYSTEMS AND CONTROLS

COPPER AND NICKEL RECOVERY WITH CHELATED ION EXCHANGE RESINS

The recovery of Copper, Nickel, Lead, Zinc and other heavy metals from solutions can be simplified by using a chelated resin. The picture above shows three solutions, a concentrated electroless nickel, a 5% electroless coppper and a 10% alkaline etchant. Each solution is shown in the native state and with a chelated resin added. The Nickel and Alkaline etchant are clear and the electroless copper still shows a bit of blue. It is hard to see the after color in the picture due to the bright blue next to each jar. These solutions are at equilibrium and therefore, some metal still is in solution. This demonstration is to show that the resin has affinity for metals in chelated solutions and the equilibrium is in favor of the resin.

In normal operation, there is no equilibrium formed as the resin is in a column and the solution travels through the column and sees fresh resin before exiting. When there is no fresh resin left, "leakage" starts to rise and the resin is regenerated.

These bottles shown are just for demonstrating the capability of the resins. Each type of chelated resins has it's own special capability.

In normal operation treating rinse waters, limits of 50-200 parts per billion are achieved at high flow rates and up to 300 ppm dissolved metals entering the system.

Fuente: (http://www.remco.com/seeing.htm)

THE REMCO METAL RECOVERY ION EXCHANGE (MRIX) PROCESS

The Remco Metal Recovery Ion Exchange (MRIX) process is unique in that all of our skid mounted systems are complete rinse water treatment units featuring microprocessor control, very low water use, complete prefiltration and VERY efficient regenerant usage. We will describe the metal recovery ion exchange process in detail starting with your feed to the system (you can pump or we can pull using a Remco Engineering Sumpless Pump).

The Metal Recovery Process

Rinse water is collected from your process and held in the main buffer tank which is included with all systems. This tank is sized for 20-30 minute retention. It serves as a buffer when the flow exceeds the design flow rate and also allows service or maintenance without interrupting production. Here the waste stream is pH adjusted to the optimum required by the ion exchange resin. The water is then transferred through a media pre-filter where sediment is removed. This transfer is accomplished with a two stage level controller that is interfaced with the pH controller. In operation the tank must be at the upper level control point and at the correct pH before the system goes on line (pumps through columns). The system stays on line until the tank reaches a second (lower) level indicator. This mechanism assures us of always having a buffering action that accommodates a varying incoming pH while delivering a very stable pH to the ion exchange resin columns. Our system utilizes duplex feed pumps, reserving one pump for standby operation. With this arrangement, down time is kept at a minimum.

The media filter is a column of sand like material (Aluminum silicate) that works as a depth filter. The more it is run, the finer it filters. When flow drops below the design flow rate, the filter is backwashed into a bag filter with the separated liquid being returned to the buffer tank. The contents of this sedimentare entirely dependent on

what debris may be going down the drains. Any dissolved metal contained in the liquid portion of the backwash is pH adjusted and processed back through the system. NOTHING GOES TO DRAIN WITHOUT PASSING THROUGH THE COLUMNS.

From the media filter the filtered metal bearing water is directed through the top of the first column of ion exchange resin out the bottom and into the top of the second column. From here it is discharged to the sewer. This configuration is referred to as lead/lag. Their respective positions to the flow of the rinse waters changes during the regeneration operation. It is in these columns where the metal ions are exchanged and captured on the exchange sites of the resin.

The ion exchange resin used varies with the application but for this example we use a weak acid chelated resin, used for Copper, Nickel, and Lead recovery. This resin is used in the sodium form. A metal ion is exchanged for a sodium ion in a similar fashion to a home water softener. For example, a Copper ion is captured when it passes through the column and is exchanged for two Sodiums. This is because the chemical valence of Copper is 2, Sodium 1, therefore, 1 Copper = 2 Sodium when exchanged. As you can see, we are not de-ionizing (DI) the water but exchanging one ion (ion exchange) for another. The advantage of this process is that you only capture what you need to remove from solution and not what you are premitted to let pass.

As the ion exchange exchange process continues, the resin slowly fills up with metal. The point at which regeneration is required is determined by monitoring the stream after is has passed through the lead (first) column and before is reaches the lag (second) column. Rising metal levels here indicate the lead column is exhausted and requires regeneration. The operator pushes a button which initiates the microprocessor to begin the regeneration cycle.

The complete cycle is simple to describe, but involves a number of valves, timed cycles, and switching. Rather than depend on manual operation and the possibility of error, a microprocessor assures you of proper functioning and very low levels of metal in the effluent.

When the regeneration cycle is initiated, the lead column is taken off line while the following (lag) column with its available exchange sites is maintained on line to process the wastewater. The lead column is then reverse rinsed from bottom to top with water. The water is returned to the the holding/pH adjust tank.

Next, the column is backwashed with of 8-15 % acid solution. The acid backwash supplies hydrogen ions which exchange with the metal ions on the resin. The resin cannot hold on to the metals at low pH. The metal ions and the acid are returned to the acid holding tank as metal salt. This is approximately 10 gallons of solution per cubic foot of resin.

The column is then rinsed with fresh water with the rinse diverted to the head of the system as it contains some metal and will require pH adjustment and polishing for metal removal. After the thorough fresh water rinse, a solution of 5% sodium hydroxide is passed through the column. This replaces the hydrogen ions on the resin with Sodium.and prepares the column for operation. If the column were left in the hydrogen form, every time a metal ion came by, it would be exhanged for the Hydrogen ion. This would lower the pH locally and cause another metal ion to be released, this would cause the metal to pass through the column (not good).

The column is backwashed again to remove the excess caustic and this rinse water , as with the others, is diverted to the head of the system for processing. The entire regeneration cycle takes about 3-5 hours depending on the system size and customer requirements.

The regenerated column is placed back on line in the lag position. The column that was previously second is now lead. The clean column is always second in line. By testing and regenerating when levels rise between the columns we are always assured of low metal concentration in the effluent because the waste stream still has to pass through a column with available exchange sites.

There are several methods for recovering the metal from the regenerant solution. One is to collect the metal as a salt by evaporation. Some

salts such as the Sodium forms of Cyanide and Chromium or the Sulfate or Chloride salts of Copper and Nickel have a slight value which allow for reclamation at minimal costs. For metallic elements such as Copper, Nickel, Zinc, etc. it is usually better to recover the pure metal by electrowinning (plating).

Fuente: (http://www.remco.com/ix-procs.htm)

BIX-S ION EXCHANGE SYSTEM

Remco Engineering BIX-S skid mounted ion exchange systems are self contained units based on a fiberglass skid and fiberglass mounting frame. These systems are designed for easy installation, good appearance, and low maintenance. Modular in construction, the systems are quickly modified if the need arises.

The system laid out in a lead/lag configuration with two or more ion exchange columns, media prefilter and/or carbon filter. The first ion exchange column fills with metal and is moved to the regeneration/reclaim module. The second ion exchange column is moved to where the first one was and is reattached to the system. While the full column is being regenerated, the system runs on one column only. When the regenerated column is returned, it is placed in the lag (second) position. These systems are also used with replaceable media when metal or pollutant level are low and the system can run for month without breakthrough.

THE BASIC ION EXCHANGE SYSTEM:

1. Dual ion exchange columns with resin.
2. Dual pumps, tefc motor
3. 12" diameter, media (aluminum silicate) depth filter
4. Diverter valve assembly
5. Acid/Caustic dosing bottle
6. Caustic and acid dosing pump
7. pH controller
8. Dual level controls, pump down and high alarm
9. 150 gallon fiberglass tank
10. Sample port between columns Operation

11. Regeneration alarm
12. Eductor for automatic effluent collection

The Basic Ion Exchange System is designed to remove metals from dilute rinse water streams and concentrate them for recovery. The system uses ion exchange resins to remove either cations (such as Copper, Nickel, Chrome +3, Cadmium, Lead) or anions (Cyanide, Chrome +6, Sulfate, Carbonate).

The rinse water is collected into the pH adjust tank at a rate less than or equal to the capacity of the system (up to 10 gpm). The rinse water is pH adjusted when necessary and pumped through the resin columns. The system consists of dual TEFC motor driven centrifugal pumps which recirculate the solution continuously through an eductor which creates a vaccum entraining the rinse water in the solution. A pH controller monitors the pH in the recirculation tank and when the pH is correct and the level reaches the set point, the solution is diverted to the columns.

As the solution passes through the column, the ions in the rinse water are exchanged for the ions on the resin. In cation columns, the exchange ions are usually H+ or Na+ (acid or Sodium) and in anion columns the ions are OH- or Cl-(Hydroxyl or Chloride). A simple example is removing Copper ions from a dilute waste stream using a weak acid cation resin. The resin is prepared with Sodium ions at the exchange sites. When the copper ions pass through the resin, they are exchanged for sodium ions. The solution that was Copper sulfate is now Sodium sulfate and the Copper ions remain on the resin in the column.

The columns are in a lead-lag (series) configuration. The solution passes through the lead column where most of the copper is removed and passes through the second column where any residual copper is removed. When the first column becomes saturated, "breakthrough" occurs and higher copper levels are passed to the second column. A sample valve is provided for checking for copper breakthrough on the lead column. When copper breakthrough is

detected, the lead column is regenerated while the lag column becomes the lead column and, temporarily, the only column.

Regeneration of a column is accomplished by washing the ion exchange resin with a reverse flow of water to remove broken resin particles, followed by an acid rinse to extract the copper from the resin. The resin is next rewashed to remove the residual acid then conditioned with caustic soda (NaOH) to return the resin to a sodium form to prevent the pH of the rinse stream from dropping when the column goes back on line. A final rinse removes the residual caustic and reclassifies the resin. The column is now ready to go on line.

The Control System:

As the unit fills with rinse water, the pH probe located in the sump senses the pH and the pH controller adjusts the pH. When the pH is below the setpoint, the diverter valve is held in the recycle mode while the pH is being adjusted. As the level in the tank rises, it reaches the highest of the three level probes and the level control switches to the pump down mode. The system will pump down until the lower probe is reached. Upon reaching the low level probe, the level control switches into the recycle mode once again.

Bix-s Ion Exchange System Specifications
Operational range:
pH: 0-14
Flow rate: .....2 -10 gpm (based on column size)
Effluent quality:.....Divalent cation leakage less than 0.5pp at design flowrate.

pH meter
Range: 0-14
.....0.01 pH
.....0.1% mv
Accuracy.....0.1% mv
Output
Relay .....5 amps @ 115
.....2.5 amps
Isolated 4-20 ma.....Over input span
Accuracy ..... 0.1% of input

Pump, main
Power.....1.0 hp
max flow rate.....10 gpm (through system)
Motor.....TEFC
Phase.....Single
Material.....Noryl

Pump, dosing (solenoid)
Duty cycle, max.....100%
Output.....30 gallon/day
Power.....200 watts

Main holding tank.....Approximately 150 gal
Dosing bottle.....5.0 gallons
Columns.....2.0-5.0 cu. ft.(27.5")

Ion Exchange Resins
Carboxylic (weak acid cation.....8 lb/cu ft copper,7 lb/cu.ft Ni
Sulfate (strong acid cation).....3.5 lb/cu.ft copper,3.0 lb/cu.ft Ni.
Chelating(iminodiacetic).....2.0 lb/cu.ft copper,1.8 lb/cu.ft Ni.

Power Requirements:.....115 volts, 5 amps
.....230 volts, 10 amps

Fuente: (http://www.remco.com/bix-s.htm)

AMBERLITE™ Ion Exchange Resins

Weak Acid Cations and Chelating Resins - Sorted in alpha-numerical order

AMBERLITE™ polymer based weak acid ion exchange and chelating resins involve mostly the use of functionalized styrene divinylbenzene or polyacrylic copolymers with different surface properties and porosities. These resins are generally supplied as macroreticular spherical beads. Amberlite weak acid ion exchange resins are widely used for metals removal and recovery in mining and chemicals, ground water remediation, waste water treatment, and brine softening.

They have shown superior performance in many different applications. During the development of these ion exchange resins the major focus was on high selectivity, very low leakage, highest operating capacity, excellent regenerability and lifetime.

Product Name	Matrix	Functional Groups	Capacity eq/L	Max. Op. Temp. °C °F	Remarks

Amberlite™ IRC76	MR*	COOH	3.90	100	210	Metal removal from aqueous solutions where the salt background is not very high. Heavy metals removal and recovery from various solutions.
Amberlite™ IRC747	MR*	Aminophosphonic	1.40	85	185	Mainly for removal of hardness from brine. Highest selectivity for Ca, Ba and Mg, very low leakage of barium.
Amberlite™ IRC748	MR*	Iminodiacetic	1.35	90	195	For heavy metals removal and recovery in plating rinses and for the purification of galvanizing solutions. Also used for hardness removal from NaCl brine in membrane chlor-alkali plants with excellent selectivity for Sr. Very low leakage.
Amberlite™ GT73	MR*	Thiol	1.25	60	140	For brine softening rhodium and mercury removal. In mercury removal very low leakage and good regenerability.
***MR = Macroreticular**						

For sampling, pricing and availability of AMBERLYST™ catalysts please contact your Rohm and Haas sales representative.
Some of our Amberlite and Amberjet ion exchange resins and Amberlyst catalysts are available in different particle size grades. For more information please consult your local Rohm and Haas sales representative.

Fuente: (http://www.rohmhaas.com/ionexchange/IP/wac.htm)

DOWEX Resins for Separation of Nickel from Liquid Media

Applications

Nickel is generally found as the multi-valent cation, Ni (II), and less often as the mono-valent ion, Ni (I). Both ionic forms can generally be sorbed by strong or weak acid cation exchange resins. For the more demanding applications, Chelating Resins from Dow may offer significant benefits to the user.

Mining and Mineral Processing: Today, DOWEX* M4195 chelating resin is used to facilitate the difficult separation of nickel from cobalt in cobalt refining facilities at INCO in Port Colbourne, Ontario, and Anglo Vaal's new state-of-the-art Chambishi Metals Plc, cobalt refinery in Zambia, Africa. Chambishi Metals Plc will process their slag dump over the next 30 years with the new $100 million cobalt plant. Chambishi metals will produce between 2,000 and 4,000 tons

of cobalt and more than 5,000 tons of copper a year from the slag dumps. See the references below for details on the seperation of nickel from cobalt refining streams.

DOWEX M4195 chelating resin is uniquely suited for recovering nickel from very acidic process streams. Several proprietary nickel-processing techniques are under development and are expected to have significant impact on the nickel mining industry.

Plating: Nickel is often a problem metal in precious metal and trivalent chromium plating operations. The unique ability of DOWEX M4195 chelating resin to selectively sorb Ni (II) from strongly acidic media makes it perfect for applications like removal of Ni from acidic plating baths and from bright-dip rinse applications in aluminum finishing processes.

Water/Wastewater: Removal of nickel from water and organic solvents is fairly common using strong acid cation resins. For waters with low levels of salt content, a strong acid cation resin such as DOWEX G-26 (H) resin would be a good starting point. In addition weakly acidic cation exchange resins like DOWEX MAC-3 resins are often quite selective for multi-valent ions such as Ni (II). If the wastewater is highly acidic, DOWEX M4195 Chelating Resin is your resin-of-choice.

Fuente: (http://gocctech.com/default2/resntech.htm)

Fuente: (http://www.dow.com/liquidseps/prod/ pt_ni.htm)

SERDOLIT® Chelating Resins

Macroporous (macroreticular) polystyrene based resin derivatized with iminodiacetic acid groups. These have a high affinity for heavy metal cations over alkali or alkaline earth metals. The macroreticular structure provides high resistance to osmotic shock and short ion diffusion paths resulting in improved kinetics. The apparent selectivity for a given metal depends upon concentration, the presence of other species, and pH. In the table below some findings at different pH values are depicted. These data provide a guideline of relative selectivities.

The affinity of the resin for a given metal can be increased or decreased by adjusting the pH. Many feed streams contain particular matter which can clog the exchanger bed. Backwashing is necessary at regular intervals. If glass columns are used, the swelling (hydraulic expansion) of the resin must be

considered. The resin swells 100 % during change from the hydrogen to monovalent salt form. Thus regeneration is best done in a funnel first with 10 %acid, then 10 % caustic and finally water to neutrality of the eluent.

To obtain the desired pH, buffer solutions are preferably used. As an example, for pH 4, 10 bed volumes of a 0.5 M solution of NaH_2PO_4/Na_2HPO_4 adjusted to pH 4 and finally10 volumes of water are percolated.

As SERDOLIT® Chelite® CHE has an extremely high affinity for polyvalent cations, the amount of regenerant is higher than required for conventional weakly acidic ion exchange resins.

Table 1: Selectivities of SERDOLIT® Chelite® for cations at different pH values

1) pH = 2		2) pH = 4		3) pH = 9 *	
Metal ion	K^M_{Ca}	Metal ion	K^M_{Ca}	Metal ion	K^M_{Ca}
Fe^{+++}	325,000	Hg^{++}	2,800	Ni^{++}	30
Cu^{++}	130,000	Cu^{++}	2,300	Cd^{++}	14
Hg^{++}	> 43,000	Pb^{++}	1,200	Cu^{++}	10
Au^{+++}	> 8,100	Ni^{++}	57	Zn^{++}	3
Ag^{+}	4,600	Cd^{++}	15	Ca^{++}	1.0
Ni^{++}	3,200	Co^{++}	6.7		
Cd^{++}	620	Zn^{++}	17		
Fe^{++}	190	Fe^{++}	4.0		
Mn^{++}	120	Mn^{++}	1.2		
Zn^{++}	120	Ca^{++}	1.0		
Al^{+++}	50				
Mg^{++}	20				
Ca^{++}	1.0	* very high ammonium background (200 g/l $(NH_4)_2SO_4$)			

SERDOLIT® Chelite® P (cat.no. 41706)

Polystyrene matrix, crosslinked with DVB, containing aminomethylphosphonic groups. It can be distinguished from SERDOLIT® Chelite® CHE by its greater affinity for cations oflow atomic mass. It has high

selectivity for transition andheavy metals (Pb, Cu and Zn in particular). The resin swellsabout 40 % during its transformation from the hydrogen tothe sodium form, so the same precautions as described above must be applied.

Operating pH range

The resin can operate in a neutral, acidic or alkaline medium,but since its capacity depends on the pH, we recommend thefollowing minimum pH values:

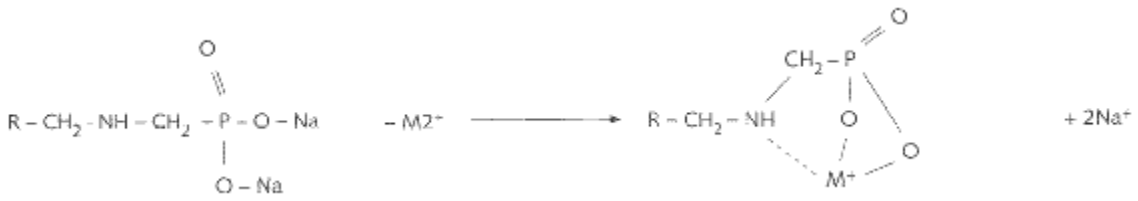
Minimum pH	2	2.5	3	4.5
Cations	Cu^{2+} Pb^{2+}	Zn^{2+}	Cd^{2+} Ca^{2+}	Mg^{2+} Ni^{2+} $Sr^{2+}Co^{2+}$

Relative affinity

The relative affinity of this resin for the various cations decreases in the order shown below:

$Pb^{2+} > Cu^{2+} > Zn^{2+} > Mg^{2+} > Ca^{2+} > Cd^{2+} > Ni^{2+} > Co^{2+} > Sr^{2+} > Ba^{2+}$

Characteristic reaction



SERDOLIT® Chelite® CHE analytical grade

HS-No. 39140000
Cation exchanger with high selectivity for heavy metal ions.
Chelating ligand: iminodiacetic acid; sodium form.
Maximum working temperature:
90 ° (190 °F Na^+ form;
70 °C (160 °F) H^+ form.

Cross Linkage:	2 % DVB
Capacity:	1.2 eq/l
Particle Size:	20 - 50 mesh (0.3 - 0.8 mm)
Moisture:	65 - 75 %
Cat.No.	**Size**
40581.01	250 g
40581.02	1 kg

SERDOLIT® Chelite® P analytical grade

HS-No. 39140000
Off-white beads with a macroporous resin structure and a general affinity for polyvalent metal cations
which may be employed for special techniques (e.g. $^{90}Sr^{++}$ determination).
Styrene-DVB matrix with aminomethylphosphonic acid groups.
Sodiumform. The total capacity, expressed in g Cu/l is 45.
Maximum working temperature: 65 °C (145 °F). Complete desorption can be effected by 5 volumes of 2N neutral acid.

Capacity:	ca. 1.3 eq/l
Particle size:	20 - 50 mesh (0.3 - 0.8 mm)
Moisture:	60 - 65 %
Cat. No.	**Size**
41706.01	250 g
41706.02	1 kg

Fuente: SERDOLIT® Exchange Resins: General Information and Applications

DIAION® chelating resin series

Chelating resins are ...

It is known that ions of transition and alkaline earth metals or some kinds of anionic species tend to form complexes by coordination with certain type of compounds called "ligand." Chelating resins are designed to catch certain types of ions by this phenomena. DIAION® chelating resins have such grades as follows:

CR11 for metallic ions, CR20 for transition metal ions and CRB02 for borate anion

DIAION® CR11

DIAION® CR11 has iminodiacetic acid group as chelating ligand which is bonded onto a highly porous crosslinked polystyrene matrix. DIAION® CR11 shows large affinity for alkaline earth and transition metal ions, and the selectivity is similar to that of ethylene diamine tetra-acetic acid (EDTA).
The selectivity order of DIAION® CR11 for metal ions is as follows:
$Cr^{3+} > In^{3+} > Fe^{3+} > Ce^{3+} > Al^{3+} > La^{3+} > Hg^{2+} > UO^{2+} > Cu^{2+} > VO^{2+} > Pb^{2+} > Ni^{2+} > Cd^{2+} > Cd^{2+} > Zn^{2+} > Co^{2+} > Fe^{2+} > Mn^{2+} > Be^{2+} > Ca^{2+} > Mg^{2+} > St^{2+}$
Adsorbed metal ions can be eluted with an acid, and the resin can be reused after regeneration with caustic alkali.
The most typical application of DIAION® CR11 is the secondary purification of brine in chlor-soda electrolysis plants. DIAION® can remove a small amount of alkaline earth metals (Ca^{2+}, Mg^{2+}, St^{2+}) from a highly concentrated sodium chloride solution.

DIAION® CR20

DIAION® CR20 has polyamine group as chelating ligand which is bonded onto a highly porous crosslinked polystyrene matrix. DIAION® CR20 shows large affinity for transition metal ions, but does not adsorb alkali, alkaline earth, and Sn·Zr·Th·Al·Fe(II) ions.
The selectivity order of DIAION® CR11 for metal ions is as follows:

$$Hg^{2+} > Fe^{3+} > Cu^{2+} > Zn^{2+} > Cd^{2+} > Ni^{2+} > Co^{2+} > Ag^{+} > Mn^{2+}$$

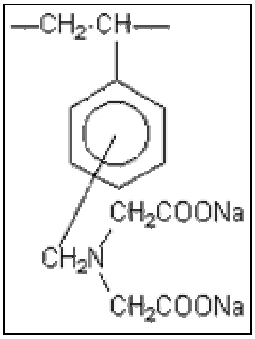
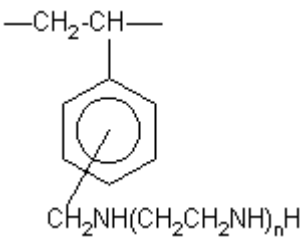
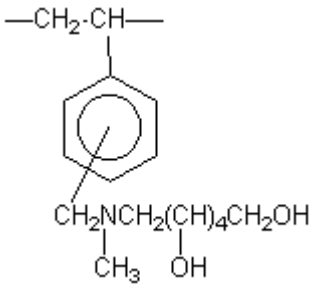
Adsorbed metal ions can be eluted with an acid, and the resin can be reused after

regeneration with caustic alkali.

DIAION® CRB02

DIAION® CR CRB02 is a borate selective resin, and has N-methylglucamine group bonded onto a highly porous crosslinked polystyrene matrix. DIAION® CR CRB02 has strong affnity for borate anion, and can adsorb borate anion in the presence of other anion species.

Properties of DIAION® chelating resins (example)

Product	DIAION CR11	DIAION CR20	DIAION CRB02
Chemical structure			
Apperance index	> 95		
Apparent density (g/L-R)	730	685	635
Ion-exchange capacity (meq/mL-R) Cu adsorption capacity (mmol/mL-R)	-- > 0.5	-- > 0.4	> 0.6 --
Water content (%)	55-65	50-60	50-60
Particle size distribution > 1180 µm < 355 µm < 300 µm	 < 5 % < 2 % --	 < 5 % -- < 1 %	 -- -- < 1 %
Effective size (mm)	> 0.40	> 0.40	> 0.35
Uniformity coefficient	< 1.6	< 1.6	< 1.6

Fuente:(http://www.serva.de/products/knowledge/071117.shtml)

Fuente: (http://www.diaion.com/Diaion_Tables/Diaion_CRtable_R_E.htm#CR11)