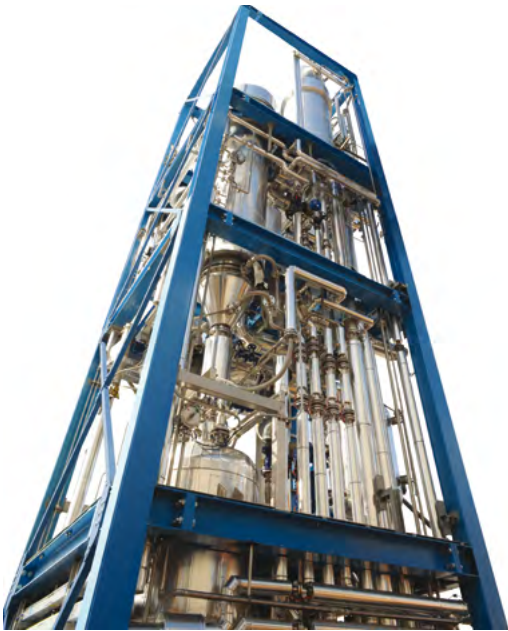




3V Tech is a leading provider of advanced
Process Solutions & Process Equipment



Process Solutions



Process Equipment

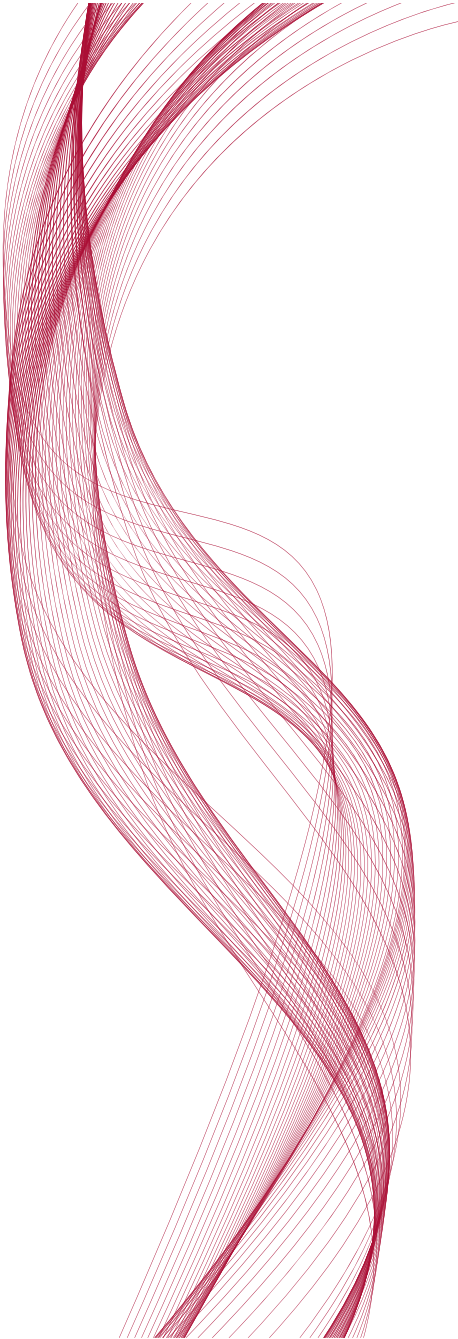
BRANDS

COGEIM - MABO - GLASSCOAT - CONSITO



Services

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3V Tech Today

3V Tech is a leading provider of advanced Process Solutions & Process Equipment

Combining process and engineering know-how with its manufacturing capabilities, 3V Tech positions itself in the market of advanced process solutions and process equipment.

The company encompasses four premier brands:

- ▼ Manufactures Filters, Filter-Dryers and Vacuum Dryers for the pharmaceutical and chemical industries.
- ▼ Specializes in thermal separation systems, manufacturing thin film, short path and falling film evaporators for the distillation of extremely viscous and thermolabile fluids.
- ▼ Delivers equipment, plants & components in Glass-lined steel.
- ▼ Specializes in chemical engineering technologies. Going from technological know-how and engineering to offering turn-key plants.

The company avails two design and manufacturing sites, with a total covered surface in excess of 16.000 m². We innovate and invest substantially in research and development and operate our own 2,000 m² testing facility where pilot plant trials can be carried out in order to confirm simulations and tests of our equipment and process solutions against real products, ensuring that all client requirements are fulfilled.

3V Tech's activities include Europe, North and South America as well as Asia. Approximately 70% of our projects are carried out on behalf of international clients.

We are well positioned to offer our clients a high quality, turn-key solution to fit their needs.

Industries we serve



Fine Chemicals



Agrochemicals



Pharma

- | | | |
|------------------|-------------------|-------------------------|
| ▼ Base Chemicals | ▼ Bio Tech | ▼ Oil & Gas |
| ▼ Polymers | ▼ Food | ▼ Flavours & Fragrances |
| ▼ Environmental | ▼ Precious Metals | |

Part of the 3V Group



3V Group was founded in 1958 in Italy and is active in the following fields:

- ▼ Fine chemicals production
- ▼ Advanced chemical engineering
- ▼ Manufacturing process systems & equipment
- ▼ Environmental solutions & technologies
- ▼ Waste treatment operation and management

Number of Employees: 650

Milestones

1958	First chemical production activities
1960/70	Industrial development of chemical production and international operations
1976	3V Group incorporates Cogeim s.p.A. and starts designing and manufacturing equipment for the chemical industry, mainly Pressure Filters, Vacuum Dryers & Fluid Jet Mills
1978	3V Group establishes 3V Inc., a chemical production plant located in Georgetown, SC-USA
1987	CPM (Porto Marghera, VE - Italy), a joint venture with ENI is established in order to develop innovative chemical products)
1990	3V develops a wastewater and contaminated sludge treatment center
2000	In order to further develop the 3V Group's industrial wastewater treatment and environmental services capabilities, 3V Green Eagle is formed
2003	3V Group acquires Mabo and enters the Thermal Separation equipment market
2006	TOP® & DUAL TOP® Wet Oxidation technologies for industrial Wastewater & Sludge treatment are recognized as "Best Available Techniques" by the European IPPC Commission
2008	3V Glasscoat production starts and 3V Group enters the Glass Lined equipment & systems market
2014	3V Group and TREVI incorporate the new Company "6V", which aims to develop and promote environmental technologies for the remediating of contaminated sites
2014	3V Group acquires CONSITO, a well-known company specialized in chemical engineering technologies, with over 45 years of experience.

3V Tech Today

R&D



One of the distinctive traits of 3V Tech is innovation, either self developed or as a support to resolve specific customer issues.

3V Tech is committed to promote improvements in the yield, productivity, cleanability, final product quality, ease of operation and maintenance of its equipment.

The R&D department is a testimony of 3V Tech's continuous commitment to optimize its solutions.

Some of the innovations introduced by 3V Tech are:

- ▼ FEP/XD - Agitated Filter-Dryer "eXtra Dryer"
- ▼ Pharma design Filter-Dryer with "3 O-Ring" bottom
- ▼ Full product discharge system "Xtract-1"
- ▼ Microwave assisted drying systems
- ▼ Thin film evaporator with a "HHV" type rotor for very high viscosity products
- ▼ XAM-1 - combined NIR and sampling system
- ▼ Phi-Glass with increased heat transfer properties
- ▼ Sigma Glass with increased electrical conductivity

Sustainability

At 3V Tech, we strongly believe in a sustainable and environmental-friendly process, because we care about our planet, home of our children and our children's children.

For this reason we are fully committed to conduct our business in a manner conducive to meeting all the obligations under environmental laws, regulations and permits and in a manner that minimizes the impact of these activities on the environment.

3V Group's commitment to the environment is so strong that 15 years ago **3V Green Eagle** was founded, a company that provides environmental solutions for the Manufacturing, Municipal, Remediation and Oil & Gas Industries and is specialized in the treatment of industrial wastewater & sludge.

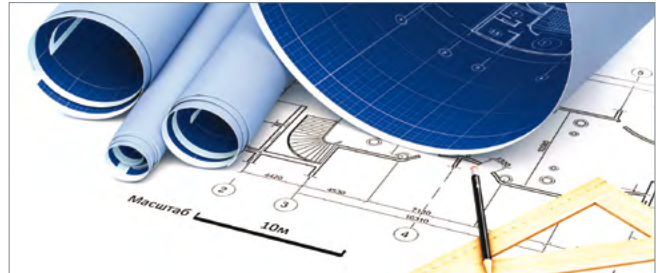
Services

The whole is greater than the sum of its parts

Together with you, our process engineers, mechanical designers and our fabrication Team, we have more than the sum of each part. From the foundation of the 3V group over 50 years ago, chemical engineering has been our passion. In strict collaboration with our customers, our process engineers control all activities from feasibility studies to system start-up to ensure delivery of the right system for your objectives.

Feasibility studies

- ▼ Conceptual design
- ▼ Process simulation
- ▼ Plant optimization
- ▼ Budget cost and timing



3V Tech's workforce is the result of an excellent combination of experience and knowledge capable to execute each individual project, granting single responsibility at every stage. This achieved through a task force, based on the special needs of the project.

Engineering

- ▼ Process
- ▼ Heat transfer
- ▼ Mechanical
- ▼ Civil and structural
- ▼ Instrumentation
- ▼ Electric
- ▼ Piping
- ▼ Environmental



Lab and pilot testing

3V Group has always maintained a strong focus on R&D and in-house engineering development in the chemical, environmental and process equipment fields, thus allowing some of our technologies to gain international recognition.

We offer the following services:

- Lab scale testing for preliminary screening and equipment selection
- Pilot plant trials for scale-up to industrial units, design of optimal operating conditions
- Highly qualified testing personnel
- In-house test facilities and mobile rental units
- Physical-chemical analysis of product samples
- Detailed test reports
- Large sample quantity for customer's R&D further analysis
- Development of particular equipment, plants and processes
- Multi-step test plants can be developed



Services

Equipment manufacturing

Proprietary equipment is manufactured in two modern manufacturing facilities.



Manufacturing Facility Dalmine - Italy



Manufacturing Facility Noventa - Italy

3V Tech's manufacturing facility in Dalmine is designed for the fabrication of medium and large size equipment. The facility was inaugurated in the mid-1980s and is approximately 12.000 m² large.

Manufacturing: Filters, Dryers, Filter-Dryers, Tanks, Evaporators, Crystallizers, Reactors, Columns, Shell & Tube Heat Exchangers, Vessels, etc

3V Tech's glass-lining facility is about 4.000 m² and is located in Noventa di Piave, Italy. It adheres to the best industrial practice criteria. Latest generation equipment ensures production efficiency and product quality. PLC controlled vertical electric furnaces, pre-heating and cooling chambers allow a lining quality at maximum level excluding contaminations and defects. All glass application is done by personnel with long experience.

Glass-lining of Reactors, Plants, Vessels, Columns, Shell & Tube Heat Exchangers, Dryers, , etc.

- ▼ **Quality assurance:** ISO 9001, latest edition
- ▼ **Qualifications:** ASME (U-stamp), PED, SQL, DIN EN ISO 3834-2 (glass-lining), ATEX 94/9/CE, SELO LICENSE
- ▼ **Design codes:** ASME, EN 13445, ISPEL, AD 2000, CODAP, SVT
- ▼ **Fabrication materials include:** Carbon Steel, 304 L or 316 L SS, Duplex SS, Superduplex SS, Hastelloy, Nickel based alloys, Nickel, Titanium, glass-lined, etc.

Turn-key plants

Offering:

- Know-how
- Basic and detailed engineering
- Project management & Project execution
- Procurement
- Expediting
- Fabrication of key equipment
- Assembling of skid or installation on site
- Installation supervision
- FAT, SAT
- DQ, IQ, OQ, PQ validation according to URS and GMP requirements
- Commissioning, start-up, training
- Remote technical assistance

Aftermarket

Offering:

- Installation supervision, Commissioning, start up & validation
- Customer training
- After sales assistance
- Quality spare parts delivery & field service
- Equipment assessment & refurbishments
- Retrofits & upgrades to improve performance
- Re-glassing
- Equipment re-certification

Thermal Separation

Building on Mabo's extensive experience, founded in 1961, 3V Tech today is a major player in thermal separation solutions.

Our thermal separation techniques are applied to applications in industries such as base and fine chemicals, specialty chemicals, oleo-chemicals, petrochemicals, plastics, fibers, polymers, agro-chemicals, biotech, pharmaceuticals, food & food ingredients, as well as for environmental and energy solutions.

Mabo designs and supplies single equipment up to complete tailor-made thermal separation solutions thanks to its integrated engineering and manufacturing capacities, from pilot testing up to turn-key plants, which can be arranged as skid-mounted units or suitable systems for on-site installation.



DOUBLE STAGE SKID-MOUNTED THIN FILM EVAPORATOR
FOR AGROCHEMICAL CONCENTRATION

Evaporation

Evaporation plants are widely used for concentration of liquids in the form of solutions, suspensions and emulsions. 3V Tech's evaporation systems, operating under vacuum in most cases, or at atmospheric condition, optimally use and combine the following technologies:

- ▼ Thin/wiped film evaporating
- ▼ Short path evaporating
- ▼ Falling film evaporating
- ▼ Forced circulation evaporating

High-viscosity products processing

High viscosity technology is a special application for the thermal treatment in polymer production and in post-reaction treatment, where the concentration of products with millions cP of viscosity occurs.

3V Tech has specifically developed a vertical thin film evaporator with a special rotor for this high viscosity technology.

Crystallization

Crystallization allows the recovery or removal of a substance from a solution with a controlled level of purity and yield.

- ▼ If high capacity is required, usually a forced circulation crystallizers, equipped with a centrifuge or belt filter for solid separation, is best suited
- ▼ If the product is difficult to handle due to the high viscosity or heavy solids, high boiling solvents technology such as an agitated wiped film evaporator is the best solution

Thermal Separation

Distillation & Rectification

Distillation & Rectification plants are widely used for separating the component substances from a liquid mixture by selective evaporation and condensation.

3V Tech's distillation & rectification systems, operating under vacuum at atmospheric condition, or in pressure, optimally use tray or packing columns, equipped with falling film, forced circulation or thin/wiped film reboiler types, depending on the application.

Solvent recovery

Since solvents are relied upon in a great variety of processes, a cost-effective and efficient solvent recovery system can bring both economical and environmental benefits.

3V Tech's solvent recovery systems can be designed for single-duty or multi-purpose operation to recover solvents from process or waste streams.



OMEGA-3 FATTY ACIDS PURIFICATION SYSTEM



MULTIPURPOSE SOLVENT RECOVERY PLANT
EQUIPPED WITH THIN FILM REBOILER



SINGLE EFFECT SKID-MOUNTED WIPED FILM
DRYER FOR SALT DRYING

Drying

Some industrial processes require the conversion of liquids, slurries or pastes to free-flowing solids, evaporating the solvent, in continuous or in batch operation.

3V Tech supplies Thin Film Dryers, both vertical and horizontal arrangement, for continuous drying single-pass operation, very effective in processing high sensitive products and when strong product dewatering is required, paddle dryers and filter-dryers for batch operation.

Solid-Liquid Separation

3V Tech's Cogeim division has been a world leading supplier of **Solid-Liquid Separation equipment** to the pharmaceutical, fine chemical and chemical industries for 40 years.

Pressure filtration is a very efficient method to separate solids from liquids, whether the product is the solid or the liquid.

The required energy consumption is minimal and, in most cases, pressure filtration does not require specific temperatures, thus preserving product from any thermal shock.

Pressure filtration is normally performed in pressure vessels, with the highest guarantee of absence of any product or environment contamination.



FILTRODRY FEP/XD 150
1.5 SQM NUTSCHE FILTER DRYER IN STERILE VERSION

Batch Filtration

Nutsche Filter-Dryers were created for the purpose of separating solids from liquids with the added benefit of removing impurities and drying in one single machine. Cogeim has specialized solutions to keep the process fully contained during filling, discharge and maintenance operations.

Cogeim filters are specially designed for solid-liquid separation. By adding a heating system to the side walls, introducing a heated agitator and operating under vacuum conditions, they can be transformed into Filter-Dryers. A Filter-Dryer can be loaded with a concentrated slurry and discharge a dry powder.

Cogeim Filter-Dryers are deep bed, solid-liquid separation systems that use a filter screen to promote the development of the filter cake.

Applications:

- ▼ Active Pharmaceutical Ingredients (API)
- ▼ Agrochemical products
- ▼ Extraction processes
- ▼ Purification processes
- ▼ Convection drying
- ▼ Hygroscopic products

Continuous Filtration

Continuous filtration is adopted where high throughput production in combination with relatively compact size equipment are desired. Cogeim's continuous Filters provide the benefit of very low energy consumption and a fully sealed and contained construction. They meet the stringent requirements for operator safety and containment of toxic products.

Cogeim offers alternative filtration technologies for thick cakes combined with high pressure and for thin cakes combined with lower pressure conditions.

Applications:

- ▼ Bulk and final pharmaceuticals
- ▼ Dyes and pigments
- ▼ Agrochemicals
- ▼ Fine Chemicals
- ▼ Food
- ▼ Plastics

Technologies & Process Solutions

Reaction

Our technical engineering solutions are based on the over 50 years of experience we carry within our different divisions: Cogeim, Mabo, Glasscoat & Consito.

In addition to developing and manufacturing process system and equipment in the evaporation and filtration fields, we also manufacture reactors and special equipment, for example first-of-a-kind reactors, made also in exotic materials.



120 M³ BIO REACTOR
STUDIED AND DESIGNED WITH OUR BIOCHEMICAL ENGINEERS



GLASS-LINED CHLORINATOR

Our staff develops both tailor-made and economical reactor solutions to meet customer needs for both process and mechanical engineering.

Our solutions have been appreciated by multiple international companies for many years. Going from pharmaceutical and food industries to fibers, polymers, agro-chemicals, plastics, oleo and petrochemicals as well as for the environmental industry.

Our process engineers, supported by computational fluid dynamics CFD and our mechanical engineers design the reactors to be fabricated in one of our shops located in Dalmine (BG) Italy or Noventa di Piave (VE) Italy.

We produce solutions for both continuous or batch reactors for demanding tasks such as:

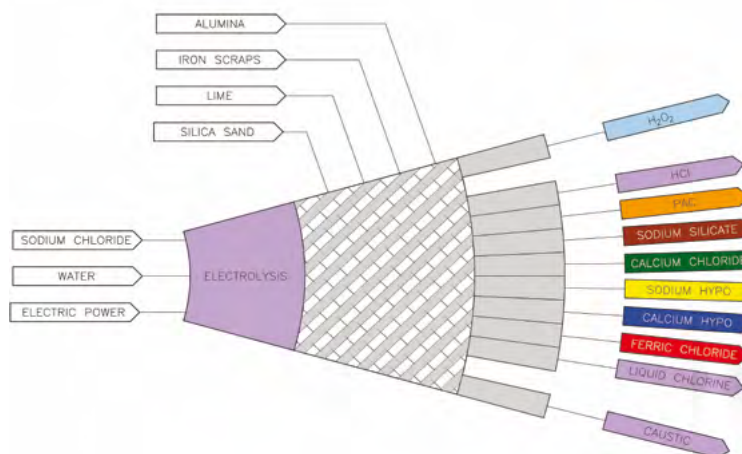
- ▼ Sulphonation: based on falling film continuous reactor
- ▼ Neutralization: continuous reactor with accurate temperature control even with high viscous products
- ▼ Hydrogenation, Chlorination: batch reactor, with accurate dosing and distribution system.
- ▼ Nylon 6: continuous finisher reactor
- ▼ Polyacrylonitrile, more commonly known as pan, precursor for carbon fiber: special continuous steam reactor.
- ▼ Fermentation: from lab skids up to a capacity of 160m³
- ▼ Polycondensation: special continuous reactor for high viscous products
- ▼ Wet oxidation: hundreds bar pressure continuous reactor made in exotic material working with both oxygen or air.

Technologies & Process Solutions

Complete Product Lines

Since 1972 Consito has been providing technology, engineering solutions and process optimization to lead you in the market of Chlor-Alkali, its derivatives & water treatment chemicals.

3V Tech acquired Consito in 2014, making it today a world-wide player in Chlor-Alkali & Derivatives and Water Treatment Chemicals, supplying Engineering and Turn-Key Plants for the following complete product lines:



Chlor-Alkali

Small scale chlor-alkali units, 1 to 15 MTPD chlorine capacity, for a reliable, highly efficient device to produce "on site" chlorine, 32% caustic soda/caustic potash and hydrogen.

Our small plants, named CHLOR-PACK®, are pre-assembled, modular skid-mounted electrolysis units, based on bipolar membrane cells. They can be equipped with transformer-rectifier, brine preparation, brine purification, depleted brine dechlorination, automatic control.

Sodium Hypochlorite

Small scale sodium hypochlorite units, 3.5 to 30 m3/day sodium hypochlorite solution capacity, up to approx. 160 g/l concentration and approx. 150 g/l available chlorine, for a reliable, highly efficient device to produce "on site" bleach.

Our small plants, named HYPO-PACK, are pre-assembled, modular skid-mounted reaction units. Usually, this package is supplied together with the CHLOR-PACK® unit, in order to produce sodium hypochlorite starting from sodium chloride as raw material.

Ferric Chloride

Ferric chloride 40% w/w solution production plants, both for waste water treatment and drinking water grades. Some different processes to produce ferric chloride, according to the feedstock are:

- ▼ Iron scraps and chlorine gas, by ferric chloride recycling
- ▼ Soft iron and chlorine gas, by ferric chloride recycling
- ▼ Ferric oxide and hydrochloric acid
- ▼ Mixed oxides, hydrochloric acid and chlorine gas
- ▼ Pickling liquors and chlorine gas, with final concentration

Complete Product Lines

Poly-Aluminium-Chloride (PAC)

- ▼ PAC 18%: mid-basicity liquid PAC, containing $17,5 \pm 0,5\%$ alumina, specific for wastewaters and neutral sizing in paper making.
- ▼ PAC 9% HB: high-basicity liquid PAC, containing $9 \pm 0,5\%$ alumina, specific for potable waters. It contains a sequestering agent which increases the flocculation and coagulation velocity, increases the storage stability of the final product, leaving very low residual aluminium content.
- ▼ PAC 30%: mid-basicity powder form, containing $30 \pm 0,5\%$ alumina.



COMPLETE FACTORY FOR SODIUM SILICATES
& PRECIPITATED SILICA



CALCIUM CHLORIDE FLAKES



GLASS-LINED PAC REACTOR

Calcium Hypochlorite

Know-how and technologies for Calcium Hypochlorite production units.

OVERCHLOR® is our Calcium Hypochlorite production plant according to the patented process developed by Consito, which minimizes the caustic soda consumption.

Sodium Silicate & allied products

Know-how and technologies for production plants of sodium silicate solutions & derivatives.

In addition to liquid sodium silicates, our plants are able to produce silicates as powder, as well as metasilicates in granular anhydrous and pentahydrate forms.

Hydrogen Peroxide

Know-how and technologies for production plants of hydrogen peroxide 35÷70%wt.

Hydrogen peroxide is manufactured using the 2-Ethylanthraquinone (EAQ) process.

Calcium Chloride

Know-how and technologies for Calcium Chloride production units as 36% solution, 75-78% flakes or 94-97% granules, basing on reaction between limestone and hydrochloric acid.

Special fluid bed dryer with internal heat recovery, which can be fed directly with the 36% solution coming from the neutralisation, avoiding the concentration step.

Technologies & Process Solutions

Environmental Equipment & Technology

3V Tech also offers superior environmental equipment with an unmatched capability of bringing complete solutions to our customers, covering planning, design, implementation and on-going profitability enhancement.



WASTEWATER & SLUDGE TREATMENT CENTER WITH
SOLVENT RECOVERY SYSTEM & TOP WET OXIDATION REACTORS



SOLVENT RECOVERY PLANT

Spent caustic wastewater

3V Tech manufactures and supplies turn-key modular systems based on 3V Green Eagle's (sister company) TOP® Wet Oxidation technology, acknowledged as a Best Available Technique (B.A.T.) for industrial wastewater and sludge treatment by the European Union IPPC Commission.

Difficult-to-treat waste streams

Lab and Pilot plants with several operation units are available to test specific solutions.

Sludge

In addition to our thin film drying technology we also implement Dual TOP® Wet Oxidation technology: the final treatment technology owned by sister company 3V Green Eagle.

Activated sludge

Improvement of ammonia removal in activated sludge process with unique 3V Tech environmental equipment has been tested successfully on pilot scale and is now under industrial construction.

Used lube oil re-refining

Re-refining of used oil by high vacuum distillation: the base oil produced is chemically and physically indistinguishable from virgin base oils.

ZLD - Zero liquid discharge

ZLD minimizes liquid discharge and maximizes liquid and solid recovery. Generally applied for wastewater liquid 3V Tech's ZLD has been implemented also to recover full chemical liquid from picking and passivation processes.

Solvent recovery

Where solvent recovery needs slurry or viscous solution processing, 3V Tech's hybrid technology minimizes energy and maintenance costs.

Technologies & Process Solutions

Customized Solutions

For over 50 years, 3V Tech has been a leading company in the design and fabrication of process equipment and modular process plants with demanding tasks.



ETHOXYLATION PILOT SYSTEM



HYBRID PURIFICATION SYSTEM



SPENT OIL RECOVERY SYSTEM

Our multidiscipline experience and expertise creates exceptional value for our customers. With fully customized products and services, 3V Tech provides unique solutions in the most challenging of process development niches.

In addition to the modular skid mounted plants, 3V Tech manufactures process equipment in house: a crucial factor in meeting a fast track timeline and a cost effective project, in particular when special Alloys are required. We can order major construction material in parallel with the development and design of the integrated process plant.

3V Tech is a family owned company structured around an integrated design-fabrication-construction philosophy with proven project execution from feasibility study stage, including pilot testing, up to turn- key plants, built on safety, efficiency and flexibility. Our team delivers high quality products and services, tailored to meet our customers specific needs. With 3V Tech you benefit from working with one company, from start to finish, with clear accountabilities and a simple communication matrix.

To deliver successful projects, we apply our skills and expertise in mechanical design, engineering, procurement and modular fabrication in combination with our process and project engineering specialists. With 3V Tech, customers implement their process technologies faster, with less risk and at a lower cost.

Some of our past realisations include:

- ▼ Biomass into liquid fuel
- ▼ Levulinic acid from biomass
- ▼ Fungicide
- ▼ Paraformaldehyde
- ▼ Clavulanic acid
- ▼ Ethoxylation
- ▼ Oligomers removal

Filters, Filter-Dryers & Vacuum Dryers



For the last 40 years Cogeim has been a leading worldwide supplier of solid-liquid separation and vacuum drying equipment to the pharmaceutical, fine chemical and chemical industries.

Cogeim's workshop specializes in manufacturing process equipment, engineered systems and large process skids using high quality construction materials such as stainless steels and special nickel based alloys. Cogeim has held an ISO 9001 certificate since 1994 and is regularly inspected by authorized agencies.

Design and manufacturing (starting from the raw material such as plates, flanges and forgings) takes place "in house", together with all quality control activities. This vertically integrated organization enables Cogeim to guarantee the highest standard available in the market for this equipment.

Cogeim represents a unique combination of expertise in process engineering and equipment manufacturing and has been the first to introduce to the market several innovations which are now a market standard.

Some examples:



FILTER-DRYER
MODEL FILTRODRY FEP/XD

Provided with a special four arm agitator that significantly increases the heated surface area in contact with the product and drastically reduces the drying time.



FILTRODRY FEP/SD 012



3 O-RING FILTER MEDIA

No screws in contact with the product allows smaller heel volumes, and minimizes dead spaces, optimizing the CIP wash for pharmaceutical GMP productions.



XTRACT-1 FULL DISCHARGE SYSTEM

Based on pneumatic conveying technology, XTRACT-1 performs complete dry solids discharge from flat-bottomed equipment, including the residual heel left under the agitator.



XAM-1

XAM-1, introduces a new generation of sidewall mounted valves, combining on-line measurement of residual solvents with solid product sampling.



MICROWAVE DRYING

Microwave drying is an alternative or auxiliary technology to conventional heating; used to optimize drying and to improve the final characteristics of the solid product.

Special designs are available for Sterile and HAPI pharmaceutical applications where cleaning, complete drainage, sterilization and containment are an integral part of the equipment design, manufacturing and testing.

Cogeim has vast experience in developing process automation systems ensuring:

- ▼ Operator safety
- ▼ Reliable machine control
- ▼ Integrated process control for the equipment and peripheral support

Cogeim can provide very simple solutions to highly complex systems, integrating plant production control, monitoring systems, data recording, history mapping and "recipe" management for different products.



FILTRODRY FEP/SD 200 - 2 sqm Filter-Dryer with heel push and heel discharge isolator.

Filters, Filter-Dryers & Vacuum Dryers

SOLID - LIQUID SEPARATION

Nutsche Filter-Dryers are deep bed, solid-liquid separation systems that use a filter screen to promote the development of the filter cake. Use of nitrogen above the cake and vacuum underneath the filter mesh improves the filtration process.

Supply of heating fluid to the jacket in combination with vacuum inside the vessel, generates the appropriate conditions for solvent evaporation and; thus, for wet cake drying.

Applications

- Active Pharmaceutical Ingredients (API and HAPI)
- Agrochemical products
- Extraction processes
- Purification processes
- Convection drying



FILTRO - FPP 100
AGITATED NUTSCHE FILTER



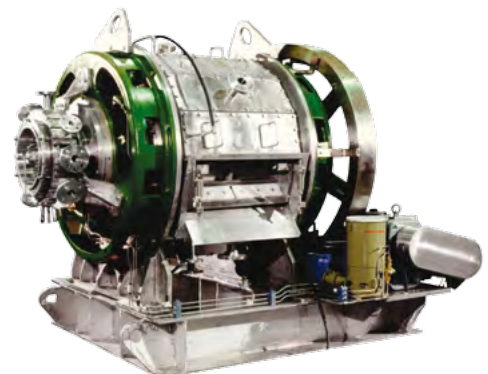
TOTUM - RFE 15
ALL-IN-ONE REACTOR - FILTER - DRYER

Cogeim Filter & Filter-Dryer models:

- ▼ FILTRO FPP Nutsche Filter
- ▼ FILTRODRY FEP/SD Nutsche Two arm Filter-Dryer
- ▼ FILTRODRY FEP/TD Nutsche Three arm Filter-Dryer
- ▼ FILTRODRY FEP/XD Nutsche Four arm Filter-Dryer
- ▼ TOTUM RFE "All - in - one" Reactor-Filter-Dryer

Cogeim also offers filtration equipment developed for thinner filter cakes with lower solids concentration where deep bed filtration may be less effective

- ▼ CLARIFIL FAP Semi - Continuous Leaf Filter
- ▼ ROTAPRESS FRP Continuous Rotary Pressure Filter



ROTAPRESS FRP 04
CONTINUOUS ROTARY PRESSURE FILTER

VACUUM DRYING

Vacuum drying is the most efficient drying method for most pharmaceutical and chemical products. Drying occurs using the appropriate combination of vacuum and temperature that generates evaporation of the solvent contained in the cake that is being dried. Agitation ensures the homogenous mixing of the end product, improves the heat exchange factor and, as a final result, reduces drying time.

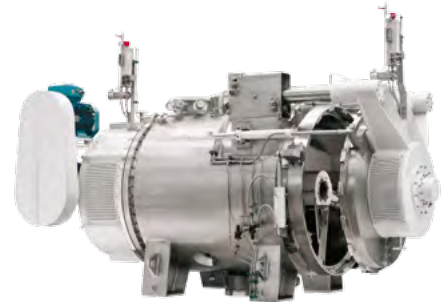
Cogeim offers a wide range of vacuum dryers, all provided with an agitator and each using conduction as the heat transfer method. An optional heated agitator is available to improve drying performance.

Applications

- Drying filtered cakes from centrifuges, nutsche filters, belt and disc filters, or filter presses that are wet with water and/or solvent
- Drying cakes with high solid content
- Bulk chemical and/or pharmaceutical production
- Food grade applications
- Steam sterilization
- Flame retardants
- Essences, fragrances, aromas, flavors
- Waste and sludge treatment
- Pyrolysis
- Thermal desorption
- Biofuels

Cogeim Dryer models

- ▼ STERIDRY ES Paddle Dryer
- ▼ STERIDRY EP Paddle Dryer
- ▼ CHEMIDRY EC Paddle Dryer
- ▼ MULTIDRY EV Pan Dryer
- ▼ MIXODRY EMV Vertical Conical Dryer
- ▼ MIXODRY EMV/DE Vertical Helical Agitator Conical Dryer



STERIDRY EP 6000
PHARMA DESIGN 6000 L PADDLE DRYER



STERIDRY ES
HORIZONTAL VACUUM PADDLE DRYER



MIXODRY EMV
VERTICAL CONICAL DRYER

Thermal Separation solutions & Turn-Key plants



Since our beginning in 1961, Mabo has provided about a thousand systems with a variety of applications. Our ability to provide engineered solutions to customers with thermal process separation problems, has made us a recognized partner in evaporation, highly-viscosity products processing, crystallization, distillation & rectification, solvent recovery and drying technologies.

Our thermal separation techniques are applied in industries such as base and fine chemicals, specialty chemicals, oleochemicals, petrochemicals, plastics, fibers, polymers, agrochemicals, biotech, pharmaceuticals, food & food Ingredients, as well as for environmental and energy solutions.

Mabo designs and supplies single equipment up to complete tailor-made thermal separation solutions. Thanks to our integrated engineering and manufacturing capabilities, we can deliver from pilot tests to full scale skid mounted industrial plants. Fabrication according to the most well-known codes & standards, from stainless steel to exotic materials.



INSTALLATION OF DOUBLE STAGE SKID-MOUNTED EVAPORATOR FOR AGROCHEMICAL CONCENTRATION



DOUBLE STAGE TFE-HHV SYSTEM FOR TDI REMOVAL FROM POLYURETHANE PRE-POLYMER

Depending on the application, we install a wide variety and combination of thermal separation equipment

- ▼ Thin/Wiped film evaporators/reboilers/dryers
- ▼ Short path evaporators
- ▼ Falling film evaporators/reboilers
- ▼ Forced circulation evaporators/reboilers
- ▼ Forced circulation evaporative and cooling crystallizers
- ▼ Tray/Packing columns

According to the requirements, Mabo designs the optimal energetic arrangement of the thermal separation plant, in order to minimize capital and operating costs.

Some of the options we apply

- ▼ Multiple effect arrangement (ME)
- ▼ Thermal vapor recompression (TVR)
- ▼ Mechanical vapor recompression (MVR)
- ▼ Use of waste heat (e.g. waste steam, hot water, etc.)
- ▼ Combination of several techniques

Thin Film Evaporators

Mabo thin film evaporator consists of a cylindrical, heated, vertical or horizontal vessel and a high-speed contacting or non-contacting rotor that maintains a film of product against the wall in highly turbulent conditions, a distributor mounted in front of the inlet of the product and a dynamic droplet separator.

Our agitated thin film evaporator is the best solution where the product is difficult to handle due to the temperature sensitivity, high viscosity, high boiling point or fouling tendency, suitable for distillation, concentration, demonomerization, degassing, drying, reaction and their combination, even for GMP applications.

It can be operated under vacuum, down to 1 mbar abs, at atmospheric condition or under pressure.



TFE
VERTICAL THIN FILM EVAPORATORS

The agitating system is essential. Mabo offers proven wiper systems for low to high viscosity liquids or slurries

- ▼ **Type L & HV:** non-contacting lobed rigid rotor with fixed and well-defined clearance from the heated wall, for wide range of viscosities.
- ▼ **Type HHV:** non-contacting rotor with toothed paddles, for positive transport of viscous and very viscous material which do not flow easily by gravity.
- ▼ **Type P & P-HV:** hinged blades sliding in contact with the heated surface, for streams with high solids and fouling products, up to crystallization and drying. Special execution for high solids and high viscosity applications (type PHV), combining movable blades and fixed toothed blades.

Short path evaporators

Mabo short-path evaporator is a wiped film evaporator with a built-in condenser in the evaporation chamber, mounted coaxially to the rotor, which results in a very short distance between the heating and condensing surfaces.

Our short path evaporator is the best solution for molecular distillation and purification of extremely heat-sensitive substances and products with very high boiling point, under extreme vacuum conditions (down to 0,001 mbar abs), thanks to the inside condenser.



SPE
SHORT PATH EVAPORATOR

Falling film evaporators

Mabo tubular falling film evaporator is a vertical evaporator consisting of a proper designed liquid distribution section at the top, a shell & tube calandria in the middle and a centrifugal or gravity vapour-liquid separator at the bottom.

Our falling film evaporator is the right solution to concentrate streams containing a small amount of suspended solids, low-medium viscous fluids and heat sensitive products.

It is particularly suited for energy saving multiple-effect (ME) evaporation, thermal vapor recompression (TVR) or mechanical vapor recompression (MVR) arrangement due to the very small operating temperature difference between heating medium and process side ("driving force").



SINGLE EFFECT MVR FALLING FILM EVAPORATOR
FOR WASTEWATER CONCENTRATION



FALLING FILM LIQUID DISTRIBUTOR



LARGE FALLING FILM EVAPORATOR

Forced circulation evaporators

Mabo tubular forced circulation evaporator consists of a shell & tube heat exchanger, a flash separator, a circulation pump and circulation ducts.

Our forced circulation evaporator is the right solution to concentrate streams containing large amounts of suspended solids, medium-highly viscous fluids and products with high tendency to fouling.

It is particularly suited as high concentration step in multiple-effect (ME) evaporation, thermal vapor recompression (TVR) or mechanical vapor recompression (MVR) arrangement because the forced circulation evaporator can handle more concentration values and/or higher solid content than a falling film evaporators.

Forced circulation crystallizers

Mabo tubular forced circulation crystallizer consists of a shell & tube heat exchanger, a flash separator/crystallizer vessel, a circulation pump and circulation ducts. Our forced circulation crystallizer is similar to the forced circulation evaporator, where special separator designs are used to separate crystals from the recirculated crystal slurry.

It is an evaporative crystallizer mainly used with products having flat or inverted solubility relative to the temperature. It is also used with compounds crystallized from solutions with scaling components, often for recovery/purification or elimination of products from liquid effluents (e.g. Zero Liquid Discharge system, ZLD).

Our forced circulation crystallizer is particularly suited as final step in multiple-effect (ME) evaporation, thermal vapor recompression (TVR) or mechanical vapor recompression (MVR) arrangement because it can handle high solids content.

Separation of crystals from slurry is done by belt filters or centrifuges.

Thin film dryers

Mabo thin film dryers are thin film evaporators with a special rotor system.

Our thin film dryer is particularly suitable for continuous drying of thermal sensitive products and whenever heat transfer performance needs improvement.

This dryer can also be used in combination with a horizontal dryer.



VERTICAL THIN FILM DRYER
AS FINAL STEP OF ZLD PLANT



OMEGA-3 FATTY ACID DISTILLATION SYSTEM

Distillation columns

Mabo distillation & rectification systems, operating under vacuum, at atmospheric condition, or under pressure, optimally use the following column types, depending on the application:

- ▼ Tray columns: sieve tray, bubble cup tray, valve tray, tunnel tray
- ▼ Packing columns: random packing, structured packing

Depending on the application, distillation columns are equipped with thin/wiped film, falling film or forced circulation reboilers.

Equipment, plants and components in Glass-lined steel



Glasscoat is the newest production unit of 3V Tech. A new, state of the art glass lining facility was established in 2008 in Noventa di Piave near Venice, Italy.

The staff at 3V Tech is a mix of engineers and technical specialists that have significant experience in the glass-lining industry. 3V Tech glass lining facility is equipped with customized software controlled electric furnaces. For every new vessel a specific firing program is developed and stored in our central data base. These customized firing programs allow us to exactly reproduce the same firing cycle for repeat jobs and optimize our vessel production to achieve optimum repeatability and prime glass quality. The plant also maintains a well-equipped lab that supports current production and develops new, advanced glass types.

Our primary glass is G2208 has a number of superior characteristics. In addition to its excellent corrosion resistance to acidic process environments, it is distinguished by higher thermal shock resistance and smoother surface finish than other glasses. The G2208 glass is available in: dark blue, light blue and white. The corrosion resistance for all three colors is the same.



Since 2008, Glasscoat has developed two new glass formulations suited for several different applications :

Phi Glass is a new formula that improves the limited heat transfer properties of the glass commonly used in the chemical industry and improves heat transfer rates across the glass interface. The glass was developed by the study of the behavior of ceramic particles in hot and cold conditions. Phi Glass is a hybrid glass that includes a percentage of ceramic particles which impart enhanced heat transfer capacity to the glass. This glass is available in light blue color and is the first of its type that has been introduced in the glass lining industry.

SIGMA Glass is not the first of its type but it is innovative in the sense that it advances the concept of electrically conductive glass. This glass offers an enhanced electric conductivity through all layers of its lining, from the ground coat up to its last layer, thus making an electrical connection between the process fluid and the substrate. Since the introduction of SIGMA glass to the market it has become the glass preferred by the major manufacturers in central Europe and in Asia.

Glasscoat

Glasscoat uses a unique application technology that creates a glass with a smoother surface and finer bubble structure resulting in lower air content. The lining consists of several layers applied and fired at temperatures in excess of 800 °C. The unique dust/liquid application technology allows Glasscoat to achieve the final thickness with fewer layers and trapping less air into the glass matrix. The result is a glass with a micro bubble structure and better dielectric properties. As proof we test all vessels to at least a Glasscoat standard of 30.000V – 10.000V to 15.000V Vhigher than the voltage used by other manufacturers in the mar-



GLASSCOAT CUSTOM REACTORS

Glasscoat engineers are familiar with European, American and Chinese pressure vessels codes, cGMP, Explosion Protection standards (ATEX, NEC and NEMA) and are familiar with the often higher technical standards of the major European customer accounts and their counterparts in the rest of the world.

Glasscoat's product portfolio covers the full range of chemical synthesis from reaction to distillation to separation and drying.

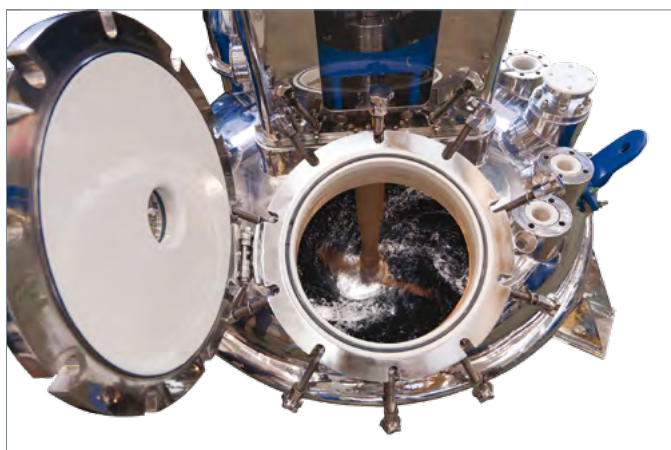
The production of glass lined process equipment is Glasscoat's speciality as it is part of 3V Tech and can therefore rely on the more than 40 years of experience in producing process equipment for the Chemical Synthesis and the Pharmaceutical industries. The cGMP design, clean room suitable and high containment equipment that has been a hallmark of Cogeim designs is also available as reaction equipment from Glasscoat.



Glasscoat

Glasscoat produces glass-lined pressure vessels according to the DIN and BN standards and according to ASME Code. Standard vessels, such as jacketed and agitated reactors, storage tanks, receivers, columns, pipes, and vessel accessories are all part of our standard product line.

As one of the world's leading specialists in glass-lining, Glasscoat also manufactures high pressure vessels such as hydrogenators as well as very specialized glass-lined equipment such as thin film evaporators, condensers, falling film evaporators, double cone dryers and blenders, nutsche filters, separation columns, vapor lines, jacketed piping, phase separators and very complex geometries like large helices. With our expertise in glassing, Glasscoat is willing and able to glass-line geometries that other companies will not even attempt.



3V PHARMA REACTOR

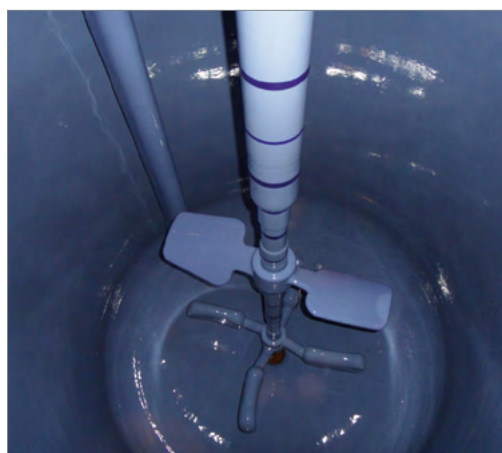


BICONICAL DRYER-BLENDER

Glasscoat reactors can be equipped with conventional one-piece agitators or our 3V Press-Lock Agitation System mixing technology. 3V Press-Lock agitators are specially designed for better mass transfer, heat transfer and gas dispersion. We can design mixers for very specific applications and optimize mixing solutions for multipurpose chemical synthesis, covering a wide spectrum of process conditions.



BE TYPE REACTOR



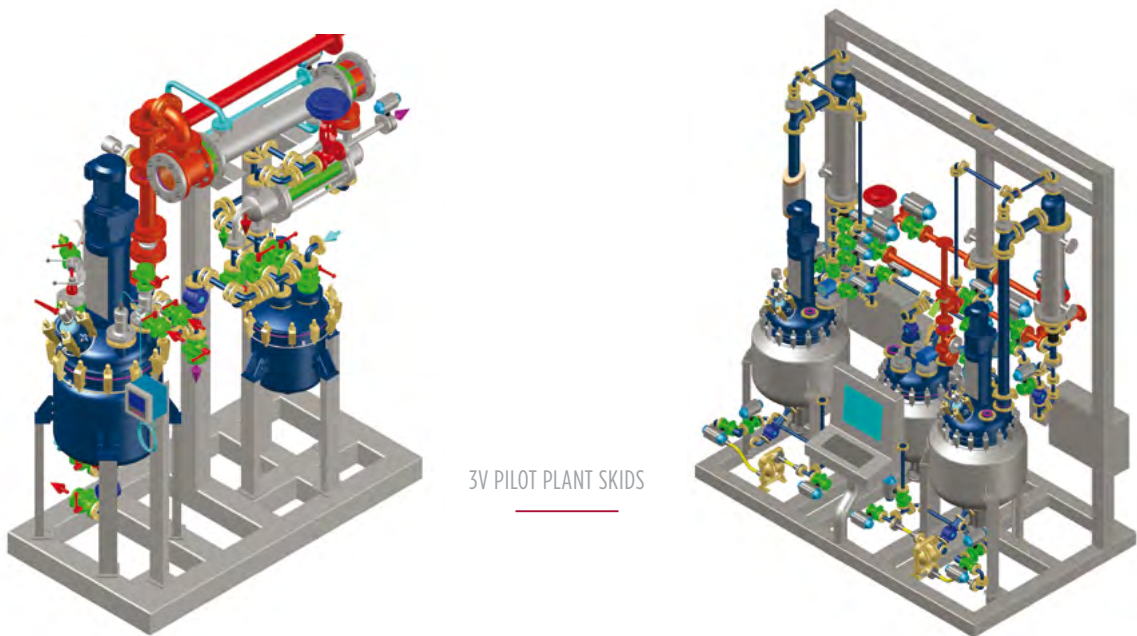
3V PRESS-LOCK

Glasscoat

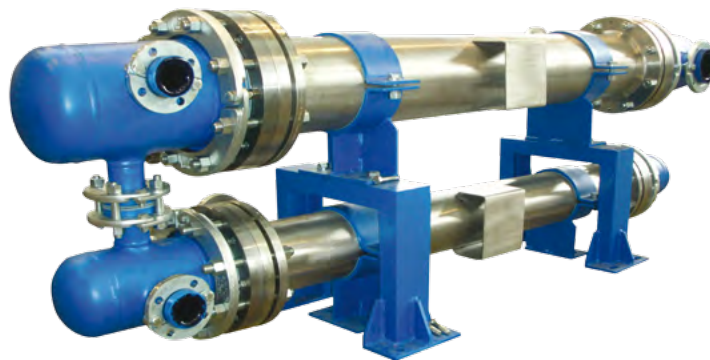
3V Tech Process Solutions division supports the Glasscoat, Cogeim and Mabo engineers in the design and selection of the optimal solution for each customer's specific requirements.

Instead of just offering individual pieces of equipment, the 3V Tech Process Solutions approach is to leverage our full spectrum of capabilities to offer complete packaged solutions for process equipment for reaction, evaporation, thermal separation, solid-liquid separation and rectification.

3V Tech Process Solutions creates complete, skid mounted systems with full PLC, instrumentation, valves, fittings and other components in conjunction with the best combination of equipment from the Glasscoat, Cogeim and Mabo product lines in most construction materials. In this way 3V Tech can create a customized solution tailored to the individual needs of each customer.



3V PILOT PLANT SKIDS



SHELL AND TUBE HEAT EXCHANGERS
SF WITH TUBES IN SIC

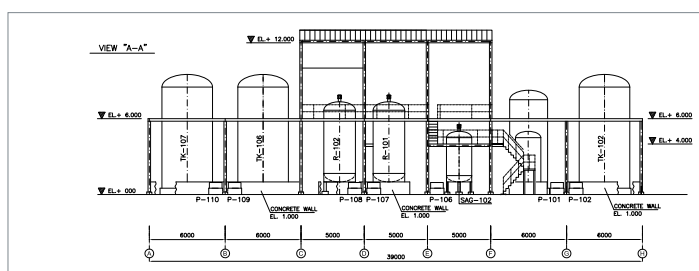
Glasscoat also offers Vessel Re-glassing

From Process Know-How to Turn-Key Plants



Since 1972 Consito has been providing technology, engineering solutions and process optimization to lead you in the market of Chlor-Alkali, its derivatives & water treatment chemicals.

- ▼ Chlor-Alkali
- ▼ Sodium Hypochlorite
- ▼ Ferric Chloride
- ▼ Poly-Aluminium-Chloride (PAC)
- ▼ Calcium Hypochlorite
- ▼ Sodium Silicate
- ▼ Hydrogen Peroxide
- ▼ Calcium Chloride



2013 - SO - PAC 9HB PLANT - LAYOUT

Milestones

1975 - Italy	know-how, design and construction, turn-key plant for PAC 18% production from alumina and hydrochloric acid (PAC 18% first industrial plant after invention and pilot plant from Snamprogetti)
1981 - Ecuador	know-how, design, supply of an integrated complex for production of Water Treatment Chemicals: salt electrolysis, chlorine, sodium hypo, calcium hypo, PolyAluminiumChloride
1984 - USA	Patent N.4.517.166 : two stage chlorination of lime for production of calcium hypo (70%) without consumption of caustic
1988 - Gulf Area	know-how, design and supply for a factory of salt electrolysis, liquid chlorine, sodium hypo, flaked caustic
1995 - Italy	design and supply of skid plant for hydrogen production from water electrolysis
2002 - Italy	design of a plant for salt electrolysis, carbon oxide production, phosgenation
2003 - Egypt	design of integrated complex for production of sodium silicate, PolyAluminiumChloride, ferric chloride, calcium chloride, soda ash from caustic
2006 - KSA	design and procurement for complete factory for 2.5 & 3.3 sodium silicate and precipitated silica from silica sand
2011 - Tunisia	know-how, design and construction, turn-key plant for sodium hypo from salt whit production of caustic chlorine
2013 - Argentina	know-how and design for production plant of PAC 9 High Basicity from PAC 18% and alum
2014 - KSA	know-how and design for production plant of calcium chloride 75% & 95% granules from limestone and hydrochloric acid and production plant of ferric chloride 40% solution from iron oxide and hydrochloric acid

CHLOR-ALKALI

Consito small scale chlor-alkali units, 1 to 15 MTPD chlorine capacity, in order to provide for a reliable, provides highly efficient device to produce chlorine “on site”, 32% caustic soda/caustic potash and hydrogen.

Our small scale plants, named CHLOR-PACK®, are pre-assembled, modular skid-mounted electrolysis units, based on bipolar membrane cells. They can be equipped with transformer-rectifier, brine preparation, brine purification, depleted brine dechlorination, caustic concentration up to 50% or to flakes.

Chlorine gas can be dried and compressed to be fed directly by pipeline to the consumers or liquefied under pressure and stored.

Alternatively, chlorine and caustic soda can be directly converted to sodium hypochlorite (“bleach”) in a further step of our plants or to hydrochloric acid.

SODIUM HYPOCHLORITE

Sodium hypochlorite, commonly known as bleach, is produced by direct reaction of chlorine gas with caustic soda solution from chlor-alkali process, to be used for water treatment, for bleaching agent in textile industry and for household products.

Consito developed know-how and technologies for small sodium hypochlorite units, 3.5 to 30 m³/day sodium hypochlorite solution capacity, up to approx. 160 g/l concentration and approx. 150 g/l available chlorine, in order to provide for a reliable, highly efficient device to produce “on site”.

Our small plants, named HYPO-PACK, are pre-assembled, modular skid-mounted reaction units. Usually, this package is supplied together with the CHLOR-PACK® unit, in order to produce sodium hypochlorite starting from sodium chloride as raw material.

Bleach can be fed directly by pipeline to the consumers or bottled.

FERRIC CHLORIDE

Ferric Chloride or Iron (III) Chloride is used as a flocculant in sewage treatment and drinking water production. It is usually produced and marketed as a concentrated solution with a minimum concentration of 40% w/w.

Consito developed know-how and technologies for ferric chloride 40% w/w solution production plants, both for waste water treatment and drinking water grades, starting from different feedstock:

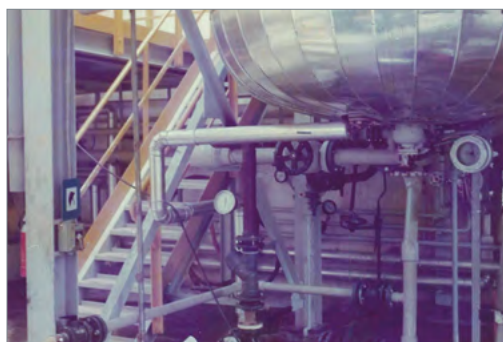
- ▼ Iron scraps and chlorine gas, by ferric chloride recycling
- ▼ Soft iron and chlorine gas, by ferric chloride recycling
- ▼ Ferric oxide and hydrochloric acid
- ▼ Mixed oxides, hydrochloric acid and chlorine gas
- ▼ Pickling liquors and chlorine gas, with final concentration



FERRIC CHLORIDE PLANT EGYPT

POLY-ALUMINIUM-CHLORIDE (PAC)

PAC is a flocculant of new concept, the specific properties of which derive from the action of its basic active constituent, namely Poly Aluminium Chloride, a polynuclear complex of polymerised hydro-aluminium ions. It is based on highly charged aluminium which results in lower dosage and therefore reduces sludge volume and pH adjustment demand. It also improves solids and/or phosphorous removal over conventional coagulants.



FIRST PAC PLANT



Consito developed know-how and technologies for production plants of the following grades of PAC:

- ▼ **PAC 18%:** mid-basicity liquid PAC, containing $17,5 \pm 0,5\%$ alumina, specific for waste waters and neutral sizing in paper making. It is used as primary coagulant aid for any clarifying/flocculation process relating to the treatment of surface or underground water and urban or industrial effluents.
- ▼ **PAC 30%:** mid-basicity powder form, containing $30 \pm 0,5\%$ alumina.
- ▼ **PAC 9% HB:** high-basicity liquid PAC, containing $9 \pm 0,5\%$ alumina, specific for potable waters.

Our high-performance PAC 9% HB (High Basicity, 60÷68%) is a formulation for treatment of drinking water, obtained by reaction of PAC 18% with aluminium sulphate, a basifier and a sequestering agent.

This sequestering agent considerably improves the characteristics of the polymer, increasing the coagulation and flocculation velocity, even in case of low turbidity and low temperature. Moreover, the sequestering agent increases the storage stability of the final product.

PAC 9HB produced with our technology hydrolyzes completely in treated water, forming large flakes which easily sediment, reducing the backwashing of sand filters and decanters.

Our PAC 9HB releases less than 100 ppb aluminium ions with a dosage of 20 ppm in treated water, whereas standard PAC 9-10% HB leaves approx. 200 ppb aluminium ions.

CALCIUM HYPOCHLORITE

Calcium Hypochlorite is an inorganic compound, marketed as granules or tablets, used for water treatment and as bleaching agent due the very high content of available chlorine, 65-70%, greater than sodium hypochlorite.

Calcium hypochlorite production process basically consists of hydrated lime reaction with gaseous chlorine.

OVERCHLOR® is our Calcium Hypochlorite production plant according to the patented process developed by Consito, which minimizes the caustic soda consumption.

SODIUM SILICATE

Sodium silicate is the generic name for a series of compounds derived from soluble sodium silicate glasses. They are water solutions of sodium oxide (Na_2O) and silicon dioxide (SiO_2) combined in various ratios, which results in solutions with differing properties that have many diversified industrial applications.

Standard commercial grades of liquid sodium silicates range in weight ratio of SiO_2 to Na_2O from 1.6 to 3.3. Sodium silicate with weight ratio $\text{SiO}_2/\text{Na}_2\text{O}$ $R=1.6\div 2.5$ is the base product of the silicate family. It can be marketed as dried powder or as a concentrated solution and a solid content of about $40\div 50^\circ\text{Bé}$. It is also the feedstock for producing other types of silicates.

Consito developed technologies for production plants of liquid and powder sodium silicates, as well as metasilicates in granular anhydrous and pentahydrate forms.



DRY SILICA HOPPER

HYDROGEN PEROXIDE

Hydrogen peroxide is a weakly acidic, colourless liquid, miscible with water in all proportions. It is the simplest peroxide and is commercially available in aqueous solution over a wide concentration range for preparation of other peroxides and as an oxidising agent mainly in pulp and paper bleaching.

Our manufacturing process involves the catalysis of the reaction of hydrogen with atmospheric oxygen to give hydrogen peroxide. 2-Ethylanthraquinone is used as hydrogen carrier.

Consito developed know-how and technologies for production plants of hydrogen peroxide $35\div 70\%$ wt.

CALCIUM CHLORIDE

Calcium Chloride is an inorganic compound, marketed as 36% solution, 75-78% flakes or 94-97% granules, used for roads de-icing, dust control, brine refrigeration, dehumidification, setting time reduction in concrete, petroleum oil extraction and food processing.

Consito developed technologies for Calcium Chloride production units as 36% solution, 75-78% flakes or 94-97% granules, basing on reaction between limestone and hydrochloric acid.

For the production of 94-97% granules, Consito, in partnership with a well known European manufacturer, developed a special fluid bed dryer with internal heat recovery, which can be fed directly with the 36% solution coming from the neutralisation, avoiding the concentration step.

Pilot Plants

Make your CAPEX investments more reliable

3V Group has always maintained a strong focus on R&D and in-house engineering development in the chemical, environmental and process equipment fields, allowing some of their technologies to gain international recognition.

3V Tech benefits from 3V Group's advanced R&D centers located in Italy & the USA.



MOZZO, BG - ITALY

Complete Multi-purpose 4 floors test center, with the necessary utilities and suitable to handle hazardous products.



GRASSOBBIO, BG - ITALY

Mainly dedicated to environmental research and to lab scale testing.



GEORGETOWN, SC - USA

Lab and pilot testing.

With state-of-the-art pilot plants our centers are optimally equipped for testing in the fields of

- ▼ Batch filtration & drying
- ▼ Evaporation, crystallization, distillation, drying
- ▼ Highly-viscosity products
- ▼ Wet Oxidation

We offer you the following services

- Lab scale testing for preliminary screening and equipment selection
- Pilot plant trials for scale-up to industrial units, design of optimal operating conditions
- Highly qualified testing personnel
- In-house test facilities and mobile rental units
- Physical-chemical analysis of product samples
- Detailed testing reports
- Large sample quantity for customer's further R&D activities
- Development of particular equipment, plants and processes for your application
- Multi-step test plants can be set-up

Pilot Plants

Pilot Units

We have at least one pilot unit for each type of equipment we manufacture, which conceptually is manufactured identically to the industrial sized equipment. Most of our pilot units are manufactured in Alloy C 22 as material in contact with the product. This guarantees a compatibility with most products used in the chemical and pharmaceutical industries.

The following pilot units are available for testing:

- ▼ Lab filters, filter-dryers and vacuum dryers
- ▼ Lab glass evaporators
- ▼ Lab thin film/short path evaporators
- ▼ Filter-dryers and various other filtration equipment
- ▼ Vacuum dryers of various kinds
- ▼ Short path evaporators
- ▼ Anaerobic digestion reactor
- ▼ Wet Oxidation pilot plant and other basic instrumentation for on-site experimental activities

If testing at customer site is preferable to our pilot plant, we have available mobile pilot units, designed for an easy transport and installation.

Furthermore our specialised personnel is available to validate the installation, provide training and assist during the initial test phases.



MOBILE PILOT PLANT



PILOT FILTER-DRYER FEP/SD



PILOT SHORT PATH EVAPORATOR SPE

Aftermarket

Our Field Service Engineers are ready to assist you

Our field service team is composed of experienced engineers and supported by a skilled back office team. We are strategically located in Italy, the UK, USA and China. Each engineer is equipped with parts, tools and the necessary safety equipment to be able to carry out his service requirements.

All technicians are fully trained to be able to comply with both local and international safety law requirements. Our team can carry out service and repair on our own equipment as well as on competitive equipment.



Our team is available to support customers for :

Installation Supervision, Commissioning, Start up & Validation

After the equipment has been delivered our service team is ready to supervise the installation, carry out the Site Acceptance Test (SAT), start up the equipment and, if required, validate its performance.



Customer Training

To make sure the equipment runs appropriately and to provide day by day maintenance we are available to train customers with a mix of practical and theoretical training sessions.



After Sales Assistance

At 3V Tech we know that equipment reliability during its entire lifecycle is of the utmost importance. Therefore we provide all our clients with a list of critical parts that our customers should keep in their storage, in order to perform a quick replacement in case of breakdown, minimizing unnecessary production downtime. If parts are not available at customer site, 3V Tech spare parts department will respond quickly to your queries.

Aftermarket

Preventive Maintenance

Proper equipment operation and maintenance ensures optimal equipment performance and reduces the risk of downtime. This leads to longer equipment service life, lower costs of ownership and greater profitability. We start with a general assessment of the installed equipment and then offer different levels of service based on the need.

Equipment Assessment & Refurbishments

With spark test, thickness mapping and mechanical inspection we can provide an assessment of the equipment status and propose refurbishments to maintain your glass-lined equipment performing at best.

Retrofits & Upgrades to Improve Performance

Together with our technical department we can offer retrofits and upgrades to help customers improve equipment performance. This activity can be carried out on site or at one of our specialized manufacturing facilities

Re-Glassing

In case Customer needs to re-glass a part or a complete reactor or vessel, this can be done in our specialized workshop.

Equipment Re-Certification

In case of need to change process design or of installation in a new plant, with the support of our Technical and Quality Department, we can support customers during the re-certification (PED, ATEX etc.) process of the equipment.

Quality Spare Parts Delivery & Field Service

During the equipment life, to ensure continuous process performance, our Back Office Team is available to provide a complete list of spares and our Field Service Team is available to carry out intervention for preventive maintenance to reduce the risk of unplanned shut down. Our Field Service Team is available for interventions and repairs of mechanical components and special repairs on glass lined reactors with Tantalum, PTFE or Hastelloy plugs, patches or sleeves.





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