



CLEAN AIR SYSTEMS



The Clean Air Systems division of Nervión Industries operates under the division of Fivemasa.



The **Group NERVIÓN INDUSTRIES** carries out its activity in the field of industrial services and applied engineering, providing its services in strategic sectors.

The activity of the Group goes back to 1953, with the foundation of Montajes Nervión, a pioneering company in its sector, specialised in Mechanical Assembly and Maintenance for industry.

The continuous growth of **NERVIÓN INDUSTRIES** throughout its history has led us to occupy a preferential position in the market, placing us at the vanguard in engineering, construction and maintenance techniques for complex industrial installations.

NERVIÓN INDUSTRIES is now a business Group with multinational presence which focusses its efforts on providing services through integrated solutions, so as to attain excellence in meeting the objectives of its Clients.



HISTORY

1953

Montajes Nervión is founded, dedicated to mechanical assembly and industrial maintenance.

1954

An era of notable growth starts, lasting until 1973, supported by the industrialisation of Spain, reaching peaks in employment of more than 7,000 workers. During these years, mechanical assembly and maintenance is carried out in sectors like:

STEELMAKING, ENERGY, CEMENT, PETROCHEMICALS, SUGAR REFINING, SHIPBUILDING.

1972

The activity of design, supply and assembly of storage tanks starts.

1980

Foundation of FIVEMASA, as a company dedicated to treating the emissions from industrial processes.

1998

Corporate change and restructuring of the company, turning it into a Group and constituting two specialist companies, Nervión Montajes y Mantenimientos S.L. and Monesa Ingeniería y Construcción S.L.

2010

Establishment of FIVEMASA in Argentina.

2014

Entry of new investors into the company and expansion of its activities.

2015

Acquisition of the company FIVEMASA by the Nervión Industries Group.



ENVIRONMENTAL TECHNOLOGY

EMISSIONS FILTRATION

(DUST, GASES, VOCs, HEAVY
METALS, DIOXINS AND FURANS,
FUMES AND MIST)

NOISE CONTROL

CENTRIFUGAL FANS

EQUIPMENT, SYSTEMS AND SERVICES

WASTE INCINERATION



EMISSIONS FILTRATION

AIR POLLUTION CONTROL SYSTEMS

BAG FILTERS

OPERATION

Part of the dust which arrives with the gas is separated in the entrance of the filter. The rest of the dust is taken on the surface of the bag, where an indispensable dust precoating is created to obtain high standards of separation.

The filter bags are cleaned by periodic pulses of compressed air, which goes to the jet pipes through the opening of the membrane valves. Each row of bags is blown creating a strong pressure increase in the interior of the bags. As a result, the dust settled on the outside of the bags falls. The membrane valves are electronically controlled allowing the adjustment of pulse time and cycle to the conditions of the desired operations. The electronic controller can be operated manually or automatically commanded by the pressure loss. The automatic controller maintains constant the pressure loss of the filter.

As a consequence, the bags' life is optimised, the consumption of compressed air is minimised (specially when the gas volume is variable), and a higher filtration efficiency is obtained.

The FIVEPULSE filters can be made of vertical bags or horizontal bags. These last ones are used when there is height limitation for the extraction of bags.

In the vertical filters, the gas entrance can take place by the hopper or by a side of the filter casing. In the horizontal filters however, it takes place by the top part.

We also have round filters, specially for those applications when people must work under high pressure values: 5000 to 8000 mm.w.g. of vacuum pressure.

There are four series of FIVEPULSE FILTERS:

SQUARE SERIES

RECTANGULAR SERIES

DOUBLE SERIES

INDEPENDENT CHAMBERS SERIES

The dust discharge is made through screw conveyor, rotary valves or double flap valves.

The filter off line allows to isolate one chamber periodically and clean this chamber. At the inlet of each chamber exists one butterfly valve and at the outlet of each chamber on the clean side one poppet valve, this allows to clean the chamber or make maintenance without stopping the filter.

In this type of filter we can use bags of 7 m length which allows to manufacture filters with 12.000 m² or more if it is necessary. This type of filter it is normally used for processes like house hold waste incinerators, coal boilers, biomass boilers, cement rotary kilns, steel works, etc.





AIR POLLUTION CONTROL SYSTEMS

HIGH TEMPERATURE FILTRATION

CERAMIC FILTERS

FIVECERAMIC

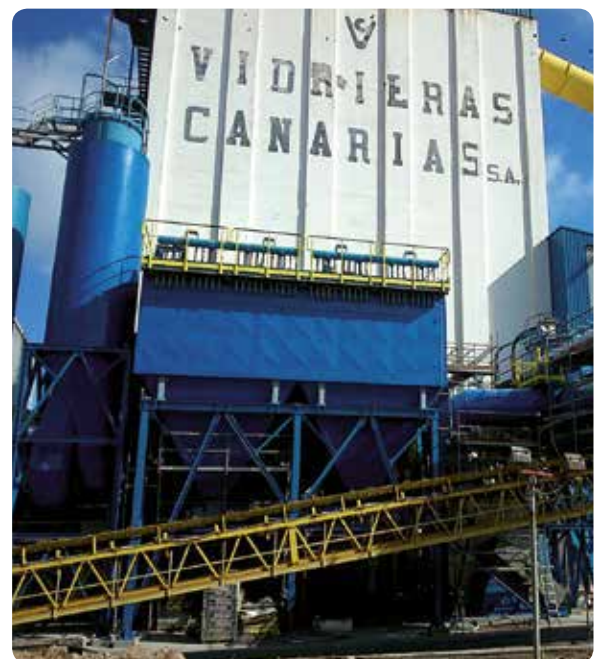
The low density ceramic filters are a new filtration technology with which, it has been demonstrated, to obtain the lowest levels of emission of solid particles to the atmosphere.

MAIN ADVANTAGES OF THE CERAMIC FILTERS

- Higher filtration temperatures, to 900°C.
- Better resistance to corrosion and to the acid attack.
- Higher filtration velocities.
- Total resistance to sparks.
- High capacity for the retention of acidic gases.
- Longer life for the ceramic elements.

ELIMINATION OF ACID GASES

The acidic gases absorption such as HCl, FH or SO₂ and the heavy metals adsorption, VOCS and dioxins, take place by introducing sodium bicarbonate or calcium hydroxide in the system and activated carbon by means of pneumatic conveying. In this way, the outcomes achieved fulfil the norms set by the CEE for toxic and dangerous emissions, coming from industrial processes such as hospital waste incineration.



CARTRIDGE FILTER

FIVECARTRIDGE

The cartridge filter is an automatic self-cleaning filter. This is done by compressed air pulses and it is used for the separation of dry dust coming from the air. Due to the star shape of the cartridge, a bigger filtration area is achieved with a minimum usage of filter space.

The cartridge filters help to achieve high filtration efficiency even with extremely fine dust particles. The maintenance of the filter is conducted from the clean side of it.



EMISSIONS FILTRATION

AIR POLLUTION CONTROL SYSTEMS

COMPACT FILTER

COMPACT FILTERS DESCRIPTION

The compact filters designed by FIVEMASA are cleaned by periodic pulses of compressed air and they are designed to work continuously and minimize residual emissions. Because compact filter provides maximum filter area in a minimum space, the volume of the filter housing can be reduced considerably and so the occupied area.

The air charged with dust enters to the filter top or laterally, the filters allows to pass the clean air to the front side of the filter. The dust falls down into the hopper after the cleaning through periodic pulses of compressed air and discharge via a rotary valve or screw conveyor plus rotary valve.

DOWN FLOW FILTER

The air with dust enter to the head of the filter housing and clean air goes out through the frontal side of the filter, soothe down flow facilities the dust to fall down into the hopper.

COMPACT FILTERS MAIN CHARACTERISTICS

- Resilient mounting flange forms and effective seal at casting interface.
- Moulded collar locates and protects filter media.
- Continuous plate bounding provides uniform support while retaining flexibility.
- Wide plate spacing promotes effective dust release.
- Flexible pleat faces respond well to pulse-jet cleaning.
- Steel edge seals afford support and protection.
- Rigid base moulding seals and support the filter fabric.
- Aerodynamic form optimises airflow and minimises pressure loss during filtering and cleaning.



EMISSIONS FILTRATION

AIR POLLUTION CONTROL SYSTEMS

ELECTROSTATIC PRECIPITATORS

As contaminated air enters the electrostatic precipitators it must pass by speak electrodes. The AC vol-tage creates a high intensity field wherein the particulate matter in the air becomes electrically charged. The charged particles then pass into a co-llector plate section which attract and collect. Liquid contaminants coalesce into droplets and run-off the collector plates in a self cleaning action.

The high efficiency of the system allows to recycle and save energy.



Applications list are numerous but the following are some where we have had success:

- Welding fumes.
- Metal working machinery.
- Atmospheric dust.
- Plasticizers in viny curing oven.
- Tenter frame in textile industry.
- Electronic manufacturing.
- Aluminium extrusion.
- Aluminium die-casting.
- Gas turbines lubricant oil breather vent.

SCR

SELECTIVE CATALYTIC REDUCTION

The primary difference between SNCR and SCR is that SCR employs a metal-based catalyst with activated sites to increase the rate of the reduction reaction. A nitrogen based reducing agent (reagent), such as ammonia or urea, is injected into the filter system or downstream the filter system. The reagent reacts selectively with the flue gas NOx within a specific temperature range and in the presence of the catalyst and oxygen.

For the majority of commercial catalysts (metal oxides), the optimum temperatures for the SCR process range from 250 °C to 427 °C.

SCR Technology: Efficiency >95%



SNCR

SELECTIVE NONCATALYTIC REDUCTION

SNCR is based on the chemical reduction of the NOx molecule into molecular nitrogen (N₂) and water vapor (H₂O). A nitrogen based reducing agent (reagent), such as ammonia or urea, is injected into the post combustion flue gas.

The SNCR process occurs within the combustion unit which acts as the reaction chamber.

Reagent is injected into the flue gas through nozzles mounted on the Wall of the combustion unit. The injection nozzles are generally located in the post-combustion area, the upper area of the furnace and convective passes. The injection causes mixing of the reagent and the flue gas. The heat of the boiler provides the energy for the reduction reaction.

In typical field applications SNCR can achieve NOx reduction efficiencies from 30% to 50%



EMISSIONS FILTRATION



AIR POLLUTION CONTROL SYSTEMS

WET PROCESS

SCRUBBERS TYPE VENTURI

The venturi filters are designed with wet entrances for high temperature gases, or dry for saturated or cold gases.

They can have a fixed section for a constant air flow and adjustable for a variable air flow.

They can be built in reinforced polyester with fibre glass, stainless, normal, covered by rubber in the inside. They are used to capture very small particles and its filtration efficiency is comparable to those of electrostatic precipitators and filter bags. However the installation cost is lower.

MEDIUM ENERGY SCRUBBER FIVESPRAY AND DYNAMIC

The filtration efficiency of these two equipment is similar, but lower than the venturi filters. The pressure loss is between 125 and 200 mm.w.g.

FIVESPRAY can be built with and extracting drag incorporated, meanwhile the second one cant. It's utilisation depends on the application and the requirements of the clients.

DROPLET SEPARATORS

By means of bended profiles, we get the elimination of droplets on vanes by inertial forces. The eliminated liquid film is drained to the lower part of the unit, getting out from the assembly device.

Depending on the nature of the gas we can supply single stage or multi-stage droplet separators with or without flushing systems.

TIPYCAL APPLICATIONS:

- Behind gas SCRUBBERS.
- Spray towers.
- Air conditioning.
- Air and gas cooler.
- Oil and water emulsions droplet separation.



EMISSIONS FILTRATION



AIR POLLUTION CONTROL SYSTEMS

ACID GAS ABSORPTION BY DRY AND SEMI-DRY SYSTEMS

ACID GAS ABSORPTION AND HEAVY METALS –DIOXINES ADSORPTION IN A DRY SYSTEM

The dry injection system is to control acid gasses such HCl, HF, HCl SO₂, heavy metals and dioxins, depending on the type of process to deal.

Our dry injection system has a big-bag or stored silo where the dry reactive such lime or sodium bicarbonate it is introduced by pneumatic transport into a contact reactor where it is produced the neutralization of the acid gasses. The final neutralization takes place in a down stream bag filter. The dust particles from the process and the particles produced in the neutralization process are separated and extracted in the bag filter via screw conveyor and rotary valve.

The heavy metals and organic compounds such dioxins and furans are also purified by the injection of activated carbon into the contact reactor and separated in the bag filter as a solid particles.

In the SEMIDRY absorption system a fine mist of absorbent (slaked lime slurry) with compressed air is introduced in the absorption

tower. The small droplet size provides the large surface area for absorption. The hot acid gasses mix with slaked lime slurry in the tower and water evaporates, leaving a dry power that it is filtered in a bag filter. The absorption tower is of the dry bottom design. The system is capable of removing SO₂, HCl, HF with high efficiencies.

The main components of the semidry absorption system are:

- Absorption tower with fluid nozzle lances for injection of slaked lime slurry and compressed air with no water carryover or waste water disposal.
- The slaked lime preparation system with interconnect piping and compressed air piping.
- The bag filter that collects down stream the dry particles generated.



EMISSIONS FILTRATION



THERMAL OXIDATION

REGENERATIVE THERMAL OXIDATION

The regenerative thermal oxidation, solvents and hydrocarbons in a chemical reaction under different conditions of temperature and residence time are decomposed to water vapour and carbon dioxide, depending on the solvent concentration the system can be operated in autothermic mode or with addition of G.N or fuel.

In order to get complete reaction the temperature at the combustion chamber has to be between 800-900°C. We use ceramic beds for the regenerative thermal recovery of the honeycomb type size 150x150x300.

The main characteristics are low thermal expansion, high heat shock resistance, anti-oxidation, large specific surface area and corrosion resistance.

The ceramic packing stores the thermal energy of the clean gas leaving the oxidation chamber and releases it during passing the following chamber. In the oxidation chamber there is a burner or gas injection to heat the gas to the operating temperature and complete reaction.

Polluted gas enters chamber A, in this chamber A the gas is heated up to oxidize the solvents, after leaving the chamber A, gas passes through the combustion chamber having a residence time at temperature 800-900°C to destroy all the solvents, then clean gas pass to chamber B and heats up the ceramic honeycombs and gas cools down, to go out of the system through a duct to

the stack. Through different valves in the system it is changed the gas inlet to chamber or chamber B, this is done every 120 seconds.

Normally these systems are of two towers, are 98% destruction efficiency. The thermal efficiency of these systems is around 95%.

When the solvents inlet concentration is high, in order to accomplish with the emission limits, the three towers system it is used and on these cases the destruction efficiency is 99,5%.

Parameters to design an RTO plant:

- Gas flow in Nm³/h with minimum, medium and maximum inlet concentrations of contaminants.
- Destruction efficiency required to accomplish with law.

Type of contaminants to destroy and concentration and presence of other contaminants that could interfere in the RTO behaviour such as:

- Dust particles.
- Corrosive compounds.
- Explosive danger.
- Requirements of increase concentration of solvents.
- Thermal efficiency required.
- Surface area available.
- Operating hours per year.

RTO CONCENTRATOR

- Very high gas flows.
 - Very low inlet concentration.
 - Have in mind the presence of dust particles in the gas flow, high boilers compounds.
 - Ratio the concentration 10:1.
-



EMISSIONS FILTRATION



CYCLONES

NOISE CONTROL

CYCLONES & MULTICYCLONES

The cyclone is a centrifugal separator, in operation dust laden air enters the tangential inlet swirls through several revolutions in the body and cone, deposits its dust load and leaves the collector through the axial cylindrical outlet. Under the influence of centrifugal force, the dust particles tend to concentrate in the thin layer of air next to the cyclone wall. The downward helical motion of the main air stream projects the separated solids out of the unit to a discharge valve and collecting bin.

Dust collection efficiency depends on a number of factors including particle size, particle density, gas temperature and general dimensions of the cyclone.

In order to get the best efficiency FIVEMASA optimises the inlet velocity to the cyclone.

The cyclones can be manufactured in groups of 2, 4 or 6 cyclones in parallel to deal with higher gas flows.



NOISE CONTROL



NOISE CONTROL

The industrial noise can cause a serious health risk to production workers. With our noise control enclosures and silencers we want to get:

- Combat the health risk of the workers.
- Increase production of the workers.
- High level of noise reduction.
- The walls of the enclosures and silencers are built from 80-100 mm thick noishield panels.



FANS

CENTRIFUGAL FANS

HIGH TEMPERATURE FANS

FIVEMASA has a wide experience in the construction of centrifugal fans, some of them are used on the air pollution control plants designed by FIVEMASA and others for the most divergent branches of industry such as steel industry, cement works, chemical industry, etc.

Some applications require special features, it starts with the material which depending on the requirement, must be particularly strong, resistant to corrosion, wear or heat resistant, sometimes requires particular wear protection with sintered hard metals, in other cases they require a gas tight construction with labyrinth seals, with gas barriers, etc, it is the applications which determine what is necessary.

DRIVING TYPES

The simplest drive arrangement is DIRECT drawing M, with overhung impeller on the motor shaft, the motor is fixed on the motor support. The use of M driving is limited by the motor size and the temperature below 60°C.

The arrangement K, the fans are directly driven by a flexible coupling, this arrangement is with overhung impeller on a drive shaft, running in roller bearings. Rotor bearing and drive motor are mounted on a common bearing/motor support.

The arrangement R is belt drive design when rotating speed of the impeller differs from the speed of the motor. The belt pulleys are mounted on the free shaft of the rotor and on the motor shaft end. It is possible to alter the speed of the fan, simply changing the pulley belts. The motor can be located on the

inclined side of the motor support up to 45 Kw and for larger motors are mounted on the common base frame separated from the fan.

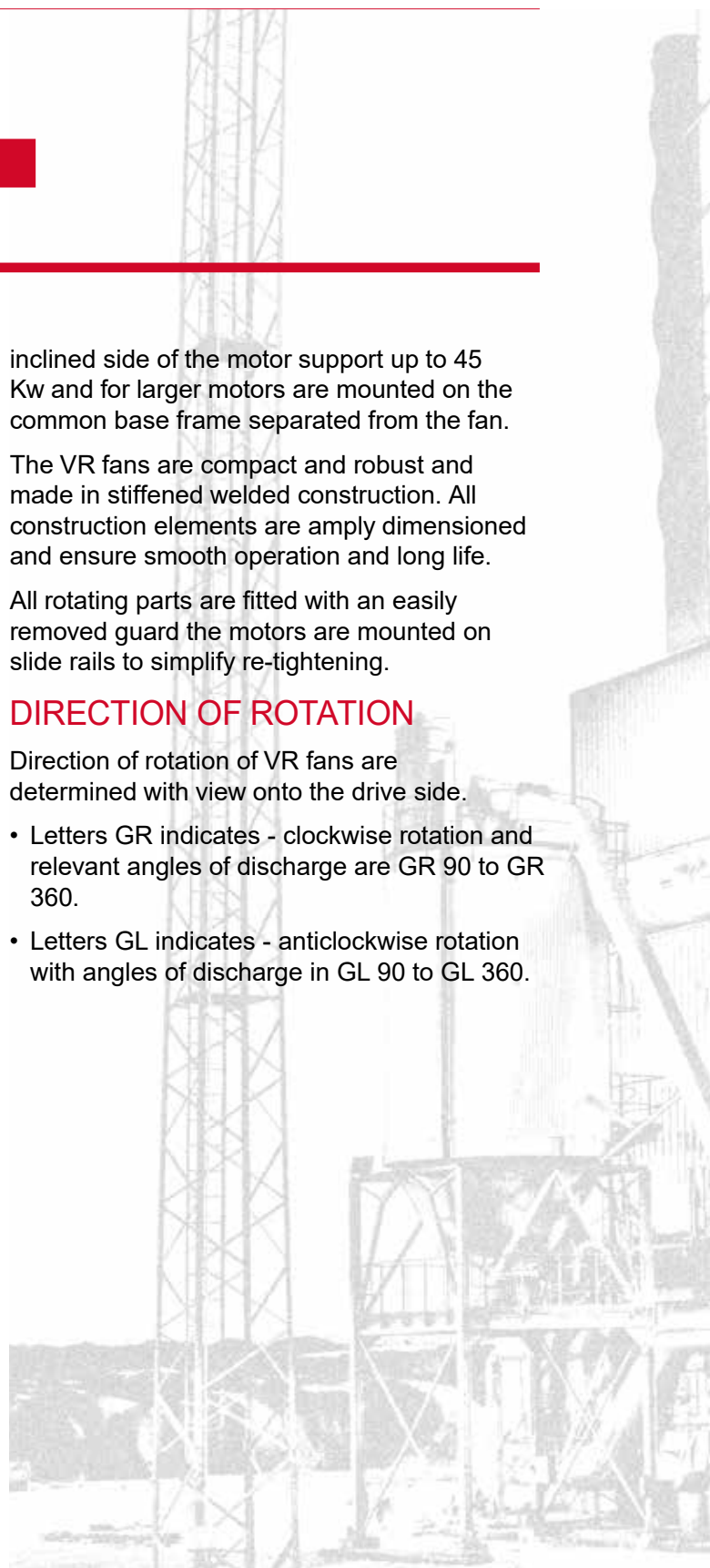
The VR fans are compact and robust and made in stiffened welded construction. All construction elements are amply dimensioned and ensure smooth operation and long life.

All rotating parts are fitted with an easily removed guard the motors are mounted on slide rails to simplify re-tightening.

DIRECTION OF ROTATION

Direction of rotation of VR fans are determined with view onto the drive side.

- Letters GR indicates - clockwise rotation and relevant angles of discharge are GR 90 to GR 360.
- Letters GL indicates - anticlockwise rotation with angles of discharge in GL 90 to GL 360.





WASTE INCINERATION

WASTE INCINERATION

The FIVEMAS waste incineration line has a large number of models for many different applications such as hospital waste, hazardous toxic wastes, pharmaceutical waste, industrial and municipal wastes.

The FIVEMAS incinerators can operate with manual charge and discharge for small capacity units or with automatic charging and automatic ash discharge through a metallic conveyor after cooling down in a container full of water. These units can operate 24 hours per day.

The units have the waste feeding system, the incineration continuous operation chamber, the post-combustion chamber with two seconds gas residual time, De-ashing system, heat recuperation system through a boiler for water or vapour and dust and gas filtration system.

OPERATIVE ADVANTAGES

- Very low emissions on dust particles because there is not turbulent flow in fixed hearth incinerators.
- Good combustion on the post-combustion chamber due the high operating temperature and residence time of two seconds.
- Complete waste combustion give inert ashes.
- Process stable gives the opportunity of changing variables wights.
- Weight reduction of wastes is 95%.

CAPACITY OF INCINERATORS

The capacity of different incinerators models varies between 10 and 1.000 Kgs/h.

TYPE OF WASTE

- Hospital waste.
- Hazardous and toxic waste.
- Municipal waste.
- Small animals.



VACUUM CLEANING SYSTEM PNEUMATIC CONVEYING

VACUUM CLEANING SYSTEMS

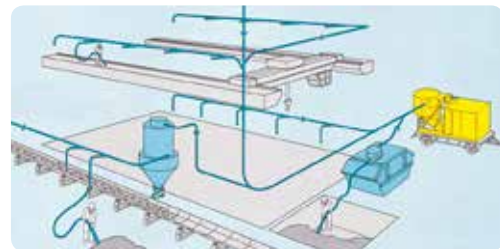
The heavy duty **STATIONARY** vacuum cleaning units are used for cleaning large surface areas, big quantities and conveying distances up to 200 m.

The **PORTABLE** units can be small units for short distances and small quantities of product or vacuum loaders widely used by cleaning contractors for big quantities and conveying distances up to 250 meters.

The size of the **VACUUM UNIT** depends on the amount of material to be removed and the number of suction outlets in use at the same time.

The **COLLECTION HOPPERS** can be portable and stationary. They are available with cyclone separator or filter separator and they can recycle product into the process.

The **MAIN FILTER SYSTEM** has a high performance pocket filter, automatic filter cleaning, mechanical or continuous reverse blow jet cleaning. The **SAFETY FILTER UNIT** with filter cartridges to protect the vacuum up.





PNEUMATIC CONVEYING

We can convey any type of material such fragile, abrasive, lightweight, non-abrasive, granular, low or high bulk density, fibrous or large, light particles materials, etc.

The systems can be built in carbon steel, stainless steel, aluminium, etc.

- Our proposal are based in:
- The specific problem of the conveying system.
- The material quantity to convey.
- The conveying distances.

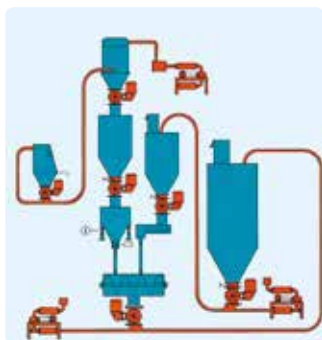
THE BASIC RULES ARE:

Many charging points:

- 1 discharge point = vacuum conveying
- 1 charging point, many discharging points= pressure conveying.

Many charging points:

- Many discharging points = pressure/vacuum conveying.



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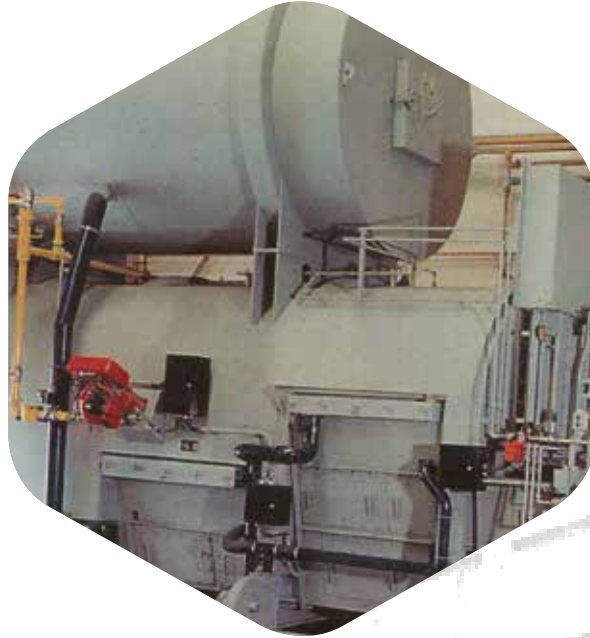
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OUR CLIENTS

“NERVIÓN,
THE RIGHT
CHOICE”

Whatever your requirements,
we're sure that NERVIÓN
INDUSTRIES is the company that
best meet your needs.



FIVEMASA
Main Customers



FOR ITS CAPABILITIES

- ✓ Multi-technology.
- ✓ Experts in developing and implementing complex projects.

FOR ITS EXPERIENCE

- ✓ Industrial solutions for all kinds of industry and life cycle stages: Quality, Prevention and Environment.

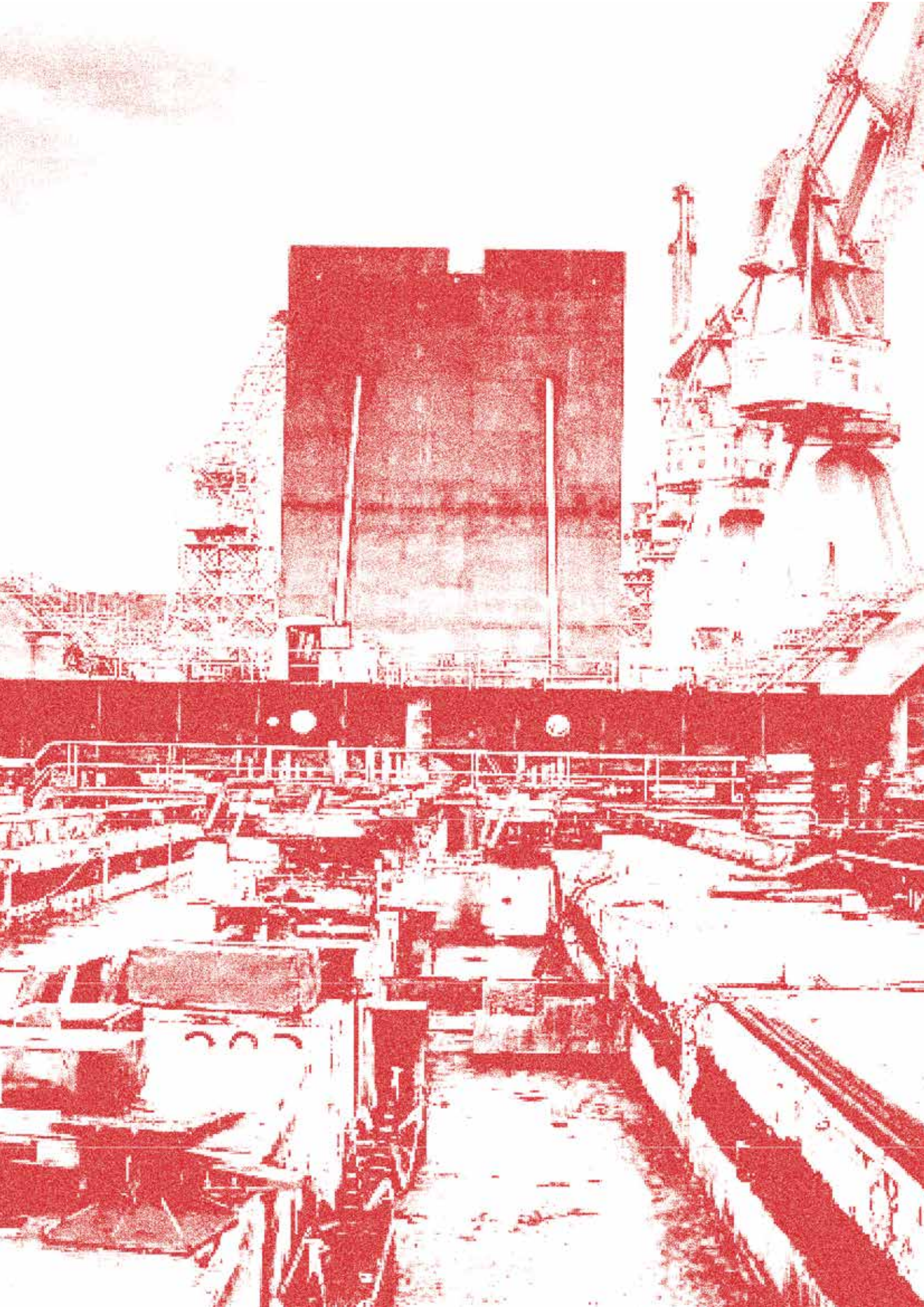
FOR ITS SERVICE

- ✓ Expertise: Mechanical and electronic services, instrumentation, automation and control.
- ✓ Service 24 hours a day, 7 days a week.
- ✓ Project engineering, maintenance engineering, applied engineering.

FOR ITS QUALITY

- ✓ Meeting deadlines, experience, cost, guarantees, customer peace of mind.





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