

## THE SCIENCE OF A PURE ENVIRONMENT



The increasing power requirements and continuous use of resources contribute directly to environment pollution. Helping to alleviate this situation has remained our goal since our inception in 1976.

IDRECO has been providing exact solutions: study and project formulation, supply of equipment, technical services and supervision, turnkey project installations concerning air and water treatment and recovery, and conversion and reutilization of various waste products.

Our extensive investment in research and development, together with our widespread experience and technologies make IDRECO a worldwide leader.

Our organizations and operative staff in Europe, Asia and North & South America have successfully completed numerous installations designed for the safeguard of the environment, be it water, air, land or energy.

At IDRECO, we work to protect the delicate equilibrium existing between economic growth and this environmental safeguard.



## COMPANY PROFILE

IDRECO was created in 1976. Since the beginning its main field of activities has been the protection of the environment with particular attention to the design and the supply of complete turn key installations for municipal waste water and industrial water treatment.

Then, in the 80ies, IDRECO, having a very well developed and organised water treatment department, created a new division, dedicated to air pollution control, which is now capable of designing supplying any kind of industrial plants for the treatment of polluted air and flue gas, such as:

- Desulphurization plants
- Denitrification plants
- Electrostatic precipitators
- Fabric filters
- Integrated gas cleaning system

In other words IDRECO owns all the technologies for a complete gas cleaning line of power stations and municipal waste incinerators of any size.

Today IDRECO S.p.A. is present in the world market of industrial installations for:

- Potabilization
- Primary and Waste Water Treatment
- Sugar and food products treatment
- Flue gas treatment and purification

Recently IDRECO has become involved in the field of district heating, industrial and municipal waste incineration.

During the last decade IDRECO has also created a few ancillary companies, operating in complementary fields, and has acquired a company manufacturing industrial boilers and incinerators (DEL MONEGO S.r.l.) and has established branches and local companies in the USA, South America and Far East.

Hence today IDRECO has become an integrated group of companies, technically led by IDRECO S.p.A.

In 1996 IDRECO has received from ICIM, certification institute belonging to CISQ and EQ Net, the UNI EN ISO 9001 Certificate.

### IDRECO Group

The set up of the IDRECO Group is:

**COMPAGNIE TERREBONNE S.A.** is the holding company for the strategic and financial coordination and leadership of the activities of the entire group.

**IDRECO S.p.A.** provides the technological support to all the companies of the group.

**DEL MONEGO** deals with design supply and installation of: dryers, calcinators, incinerators for any kind of industrial, municipal and toxic waste (gas, sludge, liquids); industrial boiler for cogeneration plants.

**INTERWAT S.r.l.** deals with supplies of specific chemical products and filtering elements applied in the energy and potabilization fields.

**IDRECO USA Limited**, and **ECO ELC S.A.** Buenos Aires, are the affiliated companies for the promotion and local operations in their or connected countries.

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## **IDRECO TECHNOLOGIES**

IDRECO S.p.A. has developed and optimised original technologies and industrial processes for the following applications through accurate research in the laboratory, pilot plants and industrial installations:

- Chemical Physical treatment for liquid industrial effluents
- Ion exchange systems for industrial waters
- Membrane systems for brackish and sea water desalination and filtration
- Condensate treatment for nuclear and fossil fired power station
- Radioactive liquid and solid waste treatment
- Potabilization
- Sugar syrup and food treatment
- Biological liquid and solid waste treatment
- Ion exchange SUPREX resin, powdered and bead type
- Filtering elements
- Flue Gas filtration, desulphurization and denitrification
- Rotary Kiln Incinerators
- Fixed Heart Incinerators
- Multiple Heart Incinerators
- Ash Handling
- Limestone, coal and various materials handling

The description of the various technological processes and the relevant main characteristics of the various installations are shown and detailed in the catalogues and pamphlets.

Moreover IDRECO has several cooperation agreements with some important companies regarding the treatment of hazardous, industrial and hospital wastes. In this field IDRECO is capable to supply:

- Composting plants
- MSW pre-sorting and compaction plants
- MSW incineration plants with grate and rotary kiln technology
- Industrial and sludge incineration plants with fluidized bed and rotary kiln technology
- Electric and thermal energy recovery from incineration plants

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## **IDRECO REFERENCE LIST**

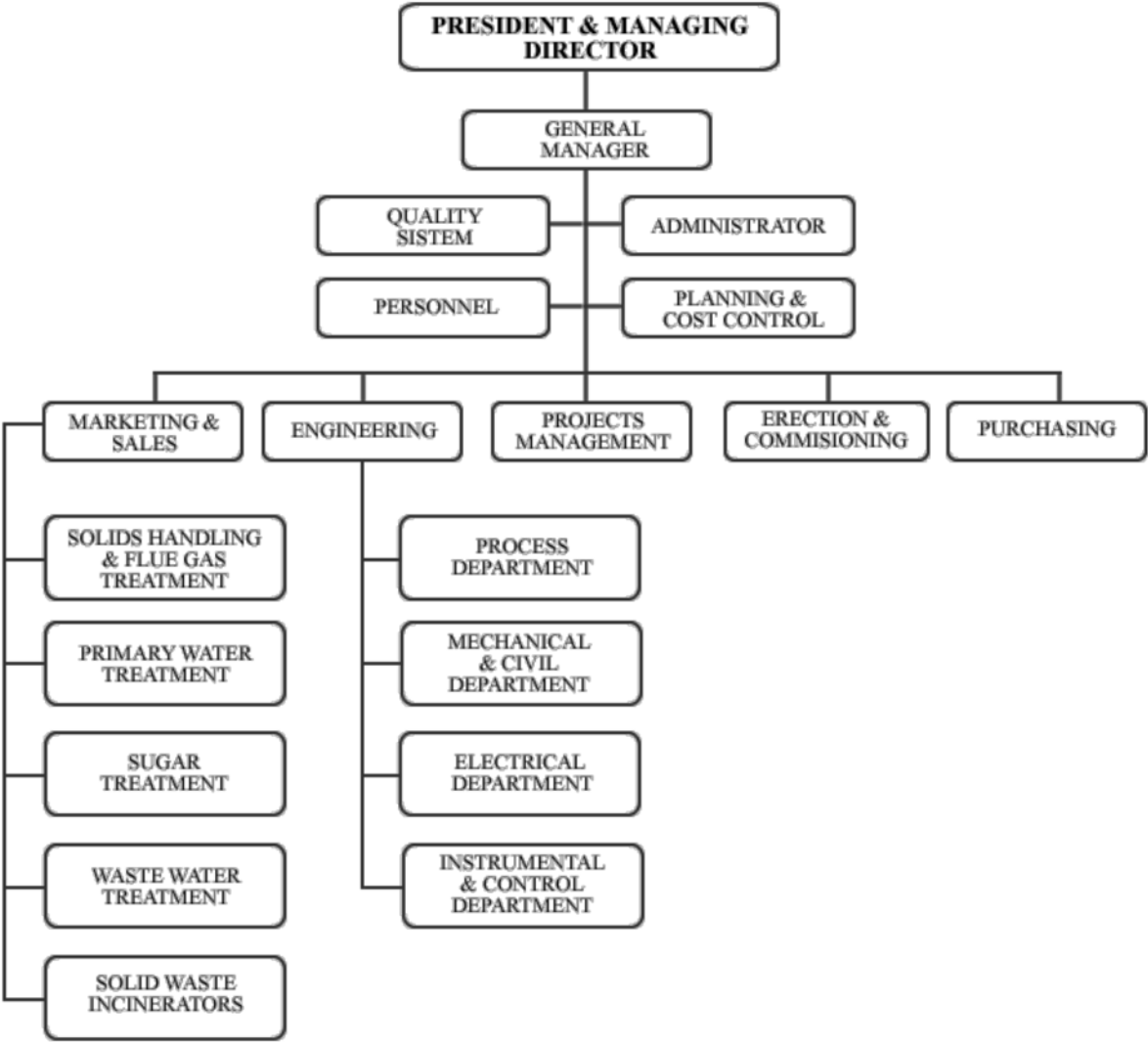
During about two decades of activity IDRECO has supplied several plants for each technology all over the world.

Complete information on the above and details can be seen in the company's [Reference List](#) section.

## **IDRECO set-up and organisation**

The organisation is typical of a main contractor engineering company and is shown in the [Organization Chart](#) page.

ORGANIZATION CHART







*IQNet, the association of the world's first class certification bodies, is the largest provider of management System Certification in the world. IQNet is composed of more than 30 bodies and counts over 150 subsidiaries all over the globe.*

CERTIFICATO n. **0592/6**  
CERTIFICATE No.

SI CERTIFICA CHE IL SISTEMA DI GESTIONE PER LA QUALITÀ DI  
WE HEREBY CERTIFY THAT THE QUALITY MANAGEMENT SYSTEM OPERATED BY

**IDRECO S.p.A.**

UNITÀ OPERATIVE / OPERATIVE UNITS

Via Pietro Nenni, 15 - 27058 Voghera (PV)  
Italia

È CONFORME ALLA NORMA / IS IN COMPLIANCE WITH THE STANDARD

**UNI EN ISO 9001:2015**

Sistema di gestione per la qualità conforme alla Norma ISO 9001 valutato secondo le prescrizioni del Regolamento Tecnico RT-05.  
Quality management system in compliance with ISO 9001 Standard and evaluated according to the requirements of Technical Regulation RT-05.

PER LE SEGUENTI ATTIVITÀ / FOR THE FOLLOWING ACTIVITIES

**EA: 18 - 28 - 29**

Progettazione ed installazione di impianti di: trattamento acque primarie e di scarico, trattamento emissioni gassose, trattamento fluidi di processo, trasporto ceneri, materiali in polvere e granulati. Progettazione e produzione di essiccatori rotanti a riscaldamento diretto e indiretto.

*Design and installation of plants for: water and waste water treatment, gaseous emission treatment, process effluents treatment, ash, limestone, coal and various material handling.*

La presente certificazione si intende riferita agli aspetti gestionali dell'impresa nel suo complesso ed è utilizzabile ai fini della qualificazione delle imprese di costruzione ai sensi dell'articolo 84 del D.Lgs. 50/2016 e s.m.i. e Linee Guida ANAC applicabili.

Riferirsi alla documentazione del Sistema di Gestione per la Qualità aziendale per l'applicabilità dei requisiti della norma di riferimento.

*Refer to the documentation of the Quality Management System for details of application to reference standard requirements.*

Il presente certificato è soggetto al rispetto del documento ICIM "Regolamento per la certificazione dei sistemi di gestione" e al relativo Schema specifico.

*The use and the validity of this certificate shall satisfy the requirements of the ICIM document "Rules for the certification of company management systems" and Specific Scheme.*

Per informazioni puntuali e aggiornate circa eventuali variazioni intervenute nello stato della certificazione di cui al presente certificato, si prega di contattare il n° telefonico +39 02 725341 o indirizzo e-mail info@icim.it.

*For timely and updated information about any changes in the certification status referred to in this certificate, please contact the number +39 02 725341 or email address info@icim.it.*

Data emissione  
First issue  
21/10/1996

Emissione corrente  
Current issue  
07/08/2018

Data di scadenza  
Expiring date  
29/04/2019

**ICIM S.p.A.**

Piazza Don Enrico Mapelli, 75 - 20099 Sesto San Giovanni (MI)  
www.icim.it



SGQ N° 004 A PRD N° 004 B  
SGA N° 005 D PRS N° 082 C  
SGE N° 005 M ISP N° 046 E  
SCR N° 006 F ETS N° 003 O  
SSI N° 008 G EMAS N° 001 P

Membro degli Accordi di Mutuo  
Riconoscimento EA, IAF e ILAC  
Signatory of EA, IAF and ILAC Mutual  
Recognition Agreements



www.cisq.com

CISQ è la Federazione Italiana di Organismi di  
Certificazione dei sistemi di gestione aziendale.  
CISQ is the Italian Federation of management  
system Certification Bodies.

# Certificate of Registration

Awarded to:

**IDRECO S.P.A.**

Company Registration number: 02302650185

Achilles Utilities Nordics & Central Europe hereby confirms that IDRECO S.P.A. is now fully registered as a supplier in Achilles Nordics & Central Europe Pre-Qualification System for the products/service codes listed in the appendix.

**Supplier Id:** 101747  
**Issued Date:** 16/10/2018  
**Expiry Date:** 12/10/2019



Anja Thorsdalen  
European Operations Manager  
Achilles Information Limited



Klaus Kræmer  
Head of Utilities, Nordics & Central Europe  
Achilles Information Limited



# Registered Products & Services

## IDRECO S.P.A.

has registered the following products and services in the Achilles Utilities Nordics & Central Europe Community:

- 1.10.18 Pollution Control Equipment
- 1.11.99 Other Energy, Oils & Fuels
- 3.10.27 PWR Chemical & Volume Control/Reactor Make-up Systems
- 3.10.99 Other Nuclear & Reactor Plant & Equipment
- 3.18.99 Other Chemicals
- 3.19.99 Other Water/Waste Water Treatment Plant & Equipment
- 3.21.35 Centrifuges

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## MAIN CONTRACTING



**(FGD Brindisi 2 x 640 MW Units)**

Through the various members of its worldwide group, IDRECO participates in all aspects of environmental protection, starting with research and development of new technologies and extending to the complete implementation of projects in both the private and public sectors. Over 100 engineers form the IDRECO Group.

Their extensive and well seasoned experience guarantee our capability to smoothly handle turnkey projects, and other technical undertakings designed to safeguard the environment.

The widely used term "prime contractor", describes quite amply our international experience. IDRECO has what it takes to handle & manage large orders for air, and water treatment recovery, conversion and reutilization of many types of waste products, and energy products, and energy production from various sources.

## **WATER TREATMENT SYSTEMS**

The treatment of water for industrial and municipal uses is one of the main concerns in our society, considering that technological processes as well as the life on the entire planet dependent on the quality of this resource.

The IDRECO Group invests heavily in research and development facilities and activities, forever seeking out new technologies. We offer the most up-to-date technologies to incorporate into plants which treat water for industrial and municipal uses such as :

### **Water Pre-treatment Systems** **Water Treatment Systems**

- Filtration
  - Ion exchange
  - Clariflocculation
  - Reverse Osmosis
  - Sludge dewatering
  - Ultrafiltration
  - Condensate Polishing with Mixed Beds and/or Filtering Elements (Decorex)
  - Production of Ion Exchange Resins and Filtering Elements
- [click here](#)

Here some photos of our installations. For complete reference list [click here](#)



Dual Media Filters



Clariflocculation



Degassing and Filtration



Demineralization



Demineralization with degasser



Regeneration system for demi units



Reverse osmosis skid



Reverse osmosis skid



Condensate polishing system



## FLUE GAS CLEANING



FGD MELNIK



FGD SULCIS



FGD BRINDISI



FGD MAE MOH



FGD FUSINA

### [FGD - FLUE GAS DESULPHURIZATION](#)

### [Photo of WFGD built in China](#)

### [DENOX - FLUE GAS DENITRIFICATION](#)

People's lives and health are directly influenced by the air that is available for them to breathe. If we do not control the gaseous emissions for industrial and municipal sources in a short time, our planet will be covered with a very dangerous grey cloud.

The utilization of air pollution control systems such as desulphurization, denitrification and particulate reduction plants, and any other required technologies is becoming increasingly more necessary.

In response to customer specifications of all types, IDRECO can apply its extensive technical know-how, and managerial capacities to the goal of solving client's environmental problems while obtaining maximum productive results with minimal operating and capital costs.

Through continuing technological updating, IDRECO is able to offer applications of the smallest dimensions to purify and guard the air we breathe.



FGD SHAJIAO C 3D BIRD VIEW

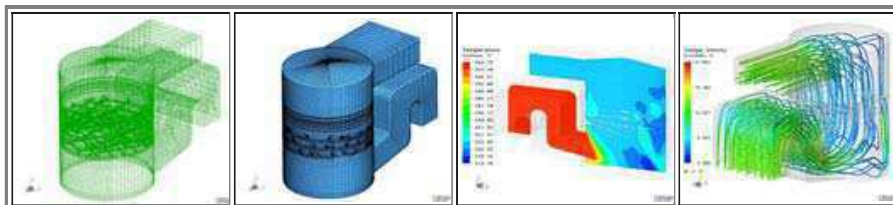


DENOX FIUME SANTO PLANT



DENOX FIUME SANTO MODEL

## FGD - FLUE GAS DESULPHURIZATION



Idreco FGD (Flue Gas Desulphurization) plants are based on the wet limestone technology with production of gypsum, which is readily usable by manufacturers of gypsum based products.

The limestone wet process has become the most popular process for flue gas desulphurization; Idreco has the experience and the know-how for the design and the construction of complete FGD plant.

### PROCESS DESCRIPTION

Flue gas ducts connect flue gas system to absorber and from absorber to stack.

A series of dampers are foreseen to intercept flue gases and eventually to by-pass the absorber.

In order to compensate the additional pressure drops, at the FGD plant inlet flue gases pressure is increased by means of a booster fan.

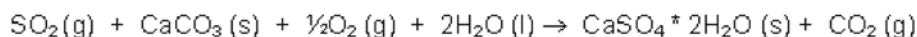
After the flue gas cleaning a reheating system for clean gases is required before they enter the stack.

The demand for the energy will be withdrawn from the raw gas by a Ljungstrom gas-gas heater (regenerative heat exchanger).

The absorber consists of a vertical cylindrical vessel, with a flue gas inlet and outlet opening. The part of the absorber between the gas inlet and gas outlet is called "the gas section" which may be subdivided in "the spray section" and in "the mist eliminator section". The part of the absorber below the gas inlet contains the absorber slurry and is called "the sump".

In the spray section, the flue gas to be treated is brought in intimate contact with a fine spray of limestone slurry droplets, as produced by the slurry spray banks, equipped with spray nozzles in sufficient quantity to ensure complete coverage of the absorber cross-sectional area and fed by slurry recycle pumps.

The SO<sub>2</sub> is absorbed to a large extent in the slurry droplets and react with the limestone present in the slurry to form gypsum (CaSO<sub>4</sub>\*2H<sub>2</sub>O), as described in the following reaction:



The process absorbs also other acid gases like HCl, HF and removes the fly ash present in the flue gas.

In order to obtain nearly 100% oxidation of sulphite to sulphate, the absorber is provided with an oxidation air injection system for the injection of a certain flow of oxidation air, supplied from a compressor system.

Above the spray section, the mist eliminator section is installed for the separation of the entrained slurry droplets from the ascending flue gas flow; the droplets fall down to the sump.

The slurry in the sump consists of an aqueous solution of dissolved salts in which approximately 10 to 15 wt% solids are suspended. In order to keep these solids suspended in the slurry, the sump is provided with side entry agitators.

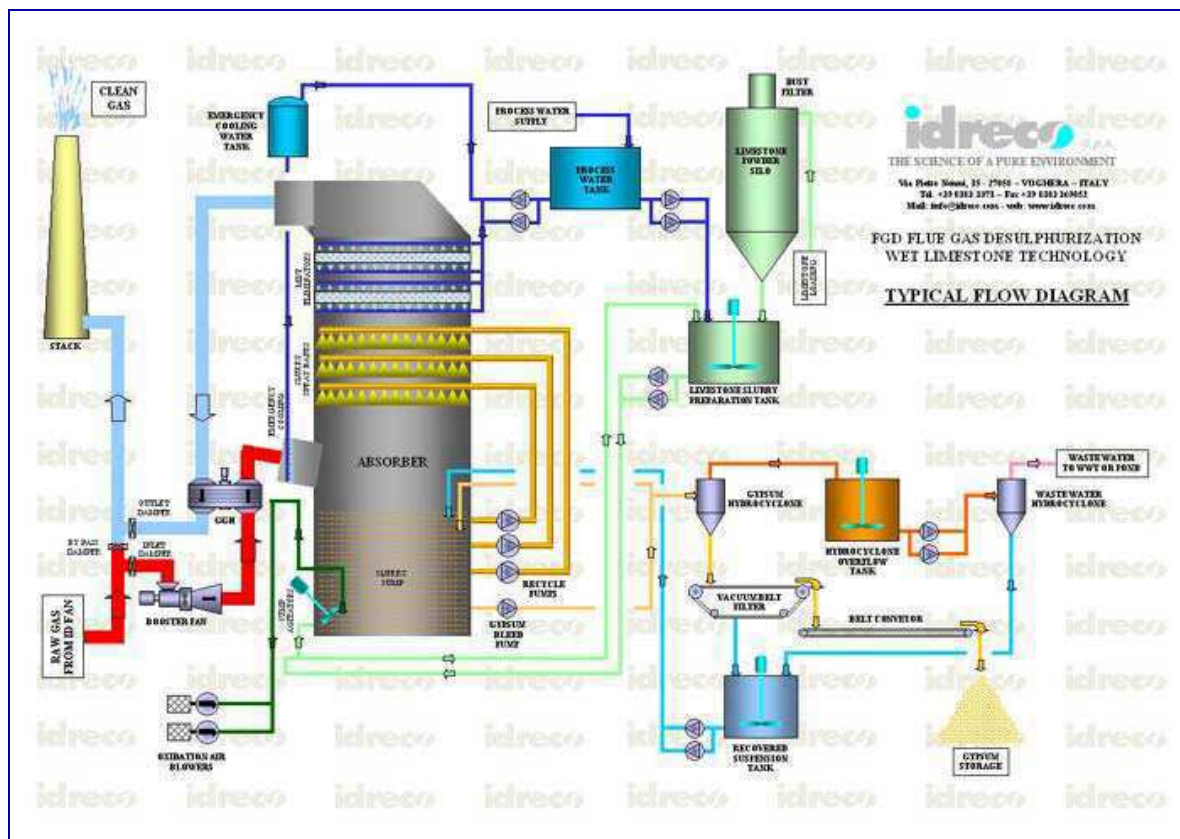
The produced gypsum must be removed from the absorber, otherwise the gypsum would accumulate in the absorber, leading to an absorber slurry with a high concentration of suspended solids.

The bleed system consists essentially of an absorber bleed pump and a gypsum cyclone battery, supplied with absorber slurry by the absorber bleed pump.

Most of the cyclone overflow flows back to the absorber together with the filtrate of the dewatering section. A part of this collected overflow is pumped to the 2nd hydrocyclone. The overflow of this hydrocyclone, containing a small quantity of solids, is sent to disposal as waste water for the purpose of discharging fly ash, inerts of the limestone and chlorides; the underflow, containing larger particles of limestone and gypsum, is recovered to the absorber.

## MAIN CHARACTERISTICS OF FGD

- High removal efficiency (> 96%).
- Limestone consumption closely approximating stoichiometric requirements
- Reduced space requirements due to compact construction
- Scrubbing tower complete with integral absorption, oxidation, crystallizing and mist separation stages
- Low residual moisture in effluent gas by optimal location of the demister
- High gypsum purity in the final product as a result of high oxidation efficiency





## WFGD Plants in China which passed the trial tests – Last update: June 2006:

目前在中国通过考核测试的湿法脱硫工厂 — 最新日期: 2006年6月



Hengshui (衡水) - Hebei (河北)  
WFGD 2x300MW + W.W.T.



Shajiao C (沙角C) - Guangdong (广东)  
WFGD 3x660MW



Shajiao A (沙角A) - Guangdong (广东)  
WFGD 1x300MW + 3x200MW + W.W.T.



Yue Yang (岳阳) – Hunan (湖南)  
WFGD 2x300MW + W.W.T.



Liu Zhou (柳州) – Guangxi (广西)  
WFGD 2x200MW



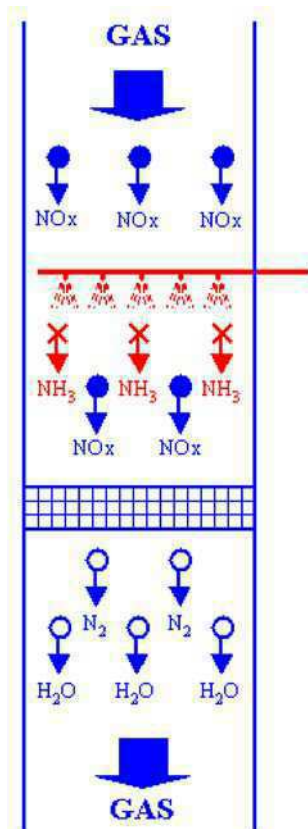
Wangtan (黄滩) – Hebei (河北)  
WFGD 2x600MW + W.W.T.



IDRECO S.p.A. – Via Pietro Nenni, 15 – Voghera (PV) – Italy

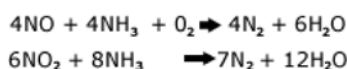
Tel +39 0383 3371 – Fax +39 0383 369052 – Web: [www.idreco.com](http://www.idreco.com) - E-mail: [info@idreco.com](mailto:info@idreco.com)

## DENOX - FLUE GAS DENITRIFICATION



### THE DENOX PROCESS

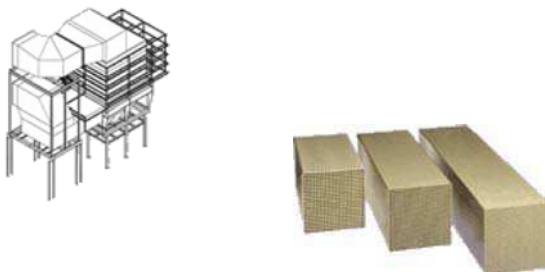
The most effective process to date for flue gas NO<sub>x</sub> removal in power plants is known as selective catalytic reduction (SCR). It operates at temperatures of between 300 °C and 400°C on the reaction principle that is shown in Fig. 1 and may be summarized by the following equations:



Before the flue gas enters the reactor, ammonia is added in the form of a NH<sub>3</sub> / air mixture, which promotes the reduction of nitrogen oxides when the gas comes into contact with the catalyst.

The DENOX unit can be installed downstream of the boiler between the economizer (feed water pre-heater) and the combustion air preheater and is known as the “high-dust” configuration.

When the unit is located downstream of the electrostatic precipitator this result is the so-called “low-dust” configuration. In this configuration the DENOX unit may be also installed downstream of the desulphurisation system. This result is the so-called “tail-end” configuration.



### THE DESIGN

Taking into account the Customer specifications and the amount of space available in each case, the size of individual reactors is optimised with the aid of pilot plant tests and with computational fluid dynamic models. The criteria of particular importance include the thorough mixture of NH<sub>3</sub> and NO<sub>x</sub> molecules in the reactor hood and a constant gas flow in the vertical part of the reactor.

The key design parameter in a reactor of this type is the so-called space velocity (SV). This is a measure of the residence time of the flue gas mixture (at STP) within the catalyst volume.

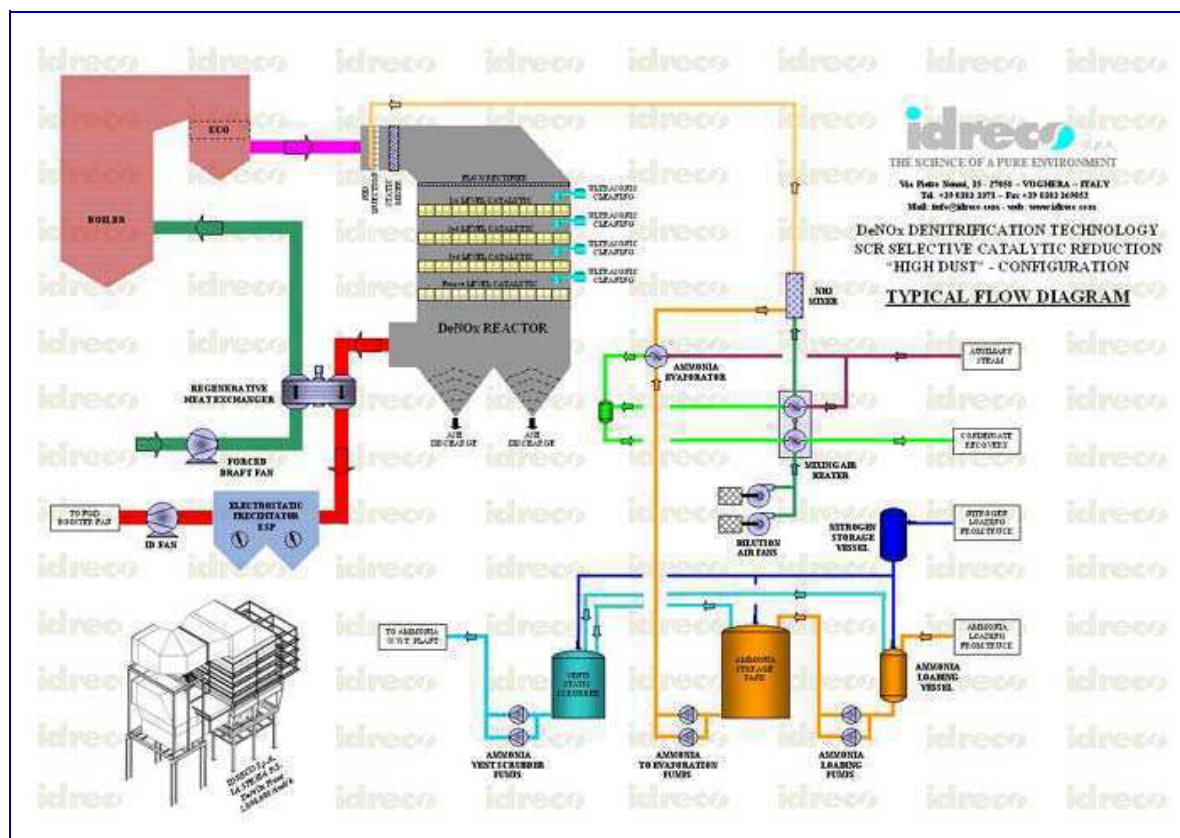
Calculation of the space velocity takes into account the following factors:

- Efficiency of the DENOX reaction
- Temperature
- Allowable ammonia slip
- Flue gas analysis
- Dust analysis

The SV is used in calculating the amount of catalyst required per unit time for a given volume of flue gas. In coal-fired power plants, the SV is normally between 1000 and 3000 per hour whereas for oil – and gas – fired boilers it will be higher, resulting in a smaller quantity of catalyst being required for the NO<sub>x</sub> reduction.

Safety aspects, including sprinkler systems, ground slabs and the disposal of gaseous and liquid residues, are also taken into consideration.

- Approximate stoichiometric operation due to high catalyst activity.
- Low pressure drop and avoidance of dust accumulation.
- Low SO<sub>2</sub> to SO<sub>3</sub> conversion rate due to the high selectivity of the catalyst.
- Honeycomb ceramic catalyst elements, higher mechanical stability.
- High resistance to temperature change.
- High resistance to erosion.
- Easy handling of catalyst modules due to their sturdy construction. Individual catalyst elements are then stacked together to form units or modules that are generally arranged in the reactor in discrete layers. As a result of the high packing density, it is possible to achieve an optimum catalyst-to-space ratio.





## WASTE TREATMENT SYSTEM

The continuous growth of consumption generates enormous quantities of liquid and solid wastes therefore the industrial world needs to address not only the ecological aspect of this situation, but also its economical impact.

IDRECO has not avoided solving this problem.

In recent years, great improvements have been made in the know-how for waste water treatments, incineration of municipal and industrial wastes. We offer the most up-to-date technologies to incorporate into plants which treat wastes such as :

### Waste Water Treatments

- Filtration
- Clariflocculation
- Sludge dewatering
- De-oiling
- ZLD Zero Liquid Discharge

### Waste Treatments for solids, liquids and gas

- Rotary incinerators -  
[click here](#) to visit our Del Monego website
- Static incinerators -  
[click here](#) to visit our Del Monego website

Here some photos of our installations. For complete reference list [click here](#)



Sludge thickener



Grid and oil removal basin



sludge settling and evaporation basins



Municipal waste watertreatment



Static incinerator for gas



Static incinerator for liquids



Rotary incinerator for solids

## **DRYERS and CALCINERS**

In 1993 IDRECO S.p.A. acquired Del Monego a company designing and supplying dryers, calciners and incinerators since 1935. These industrial equipment and complete plants have been therefore sold in the recent years as part of the IDRECO line of products named “IDRECO-Del Monego”.

The wide production of dryers of IDRECO-Del Monego technology allows to propose, for each type of product

to be treated, the most suitable thermal dryer such as :

- **Direct Rotary Dryers** which can use as heating media:

flue gases, for sand, clay, mineral products treatment;

hot air, produced by heat exchangers, for the drying of plastic material and heat sensible products and which cannot come in direct contact with flue gases.

- **Indirect Rotary Dryers** which are internally contained to a refractory furnace which is crossed by flue gases, for carbon black drying.
- **Steam Tube Rotary Dryers** for melamine and soya bean.
- **Flue Gas Tube Rotary Dryers** for drying of dusty materials with initial low moisture, such as talcum and carbon.

When it is requested to heat material up to high temperatures, also higher than 1000 °C, rotary calciners are used. They are classified as:

- **Direct Calciners** where the material, in direct contact with combustion gases, normally in counter-current way, is brought up to 1200 – 1300 °C. The main applications are: clay calcining, metal catalyst production, activated carbon regeneration.
- **Indirect Calciners** where the material is heated up to 1100 °C by combustion gases which cross a furnace. Indirect calciners are used when the product cannot come in direct contact with combustion gases and when it is requested to operate in a controlled atmosphere. The main applications are: molecular sieve, alumina, silica gel.

For complete reference list [click here](#) and for Del Monego web site [click here](#)

Here some photos of our installations.



Direct rotary dryer



Direct rotary dryer



Direct rotary dryer



Indirect rotary dryer



Indirect rotary dryer



Indirect rotary dryer 14'x 85'



Steam tube rotary dryer



Activated carbon regeneration



Direct calciner for borax