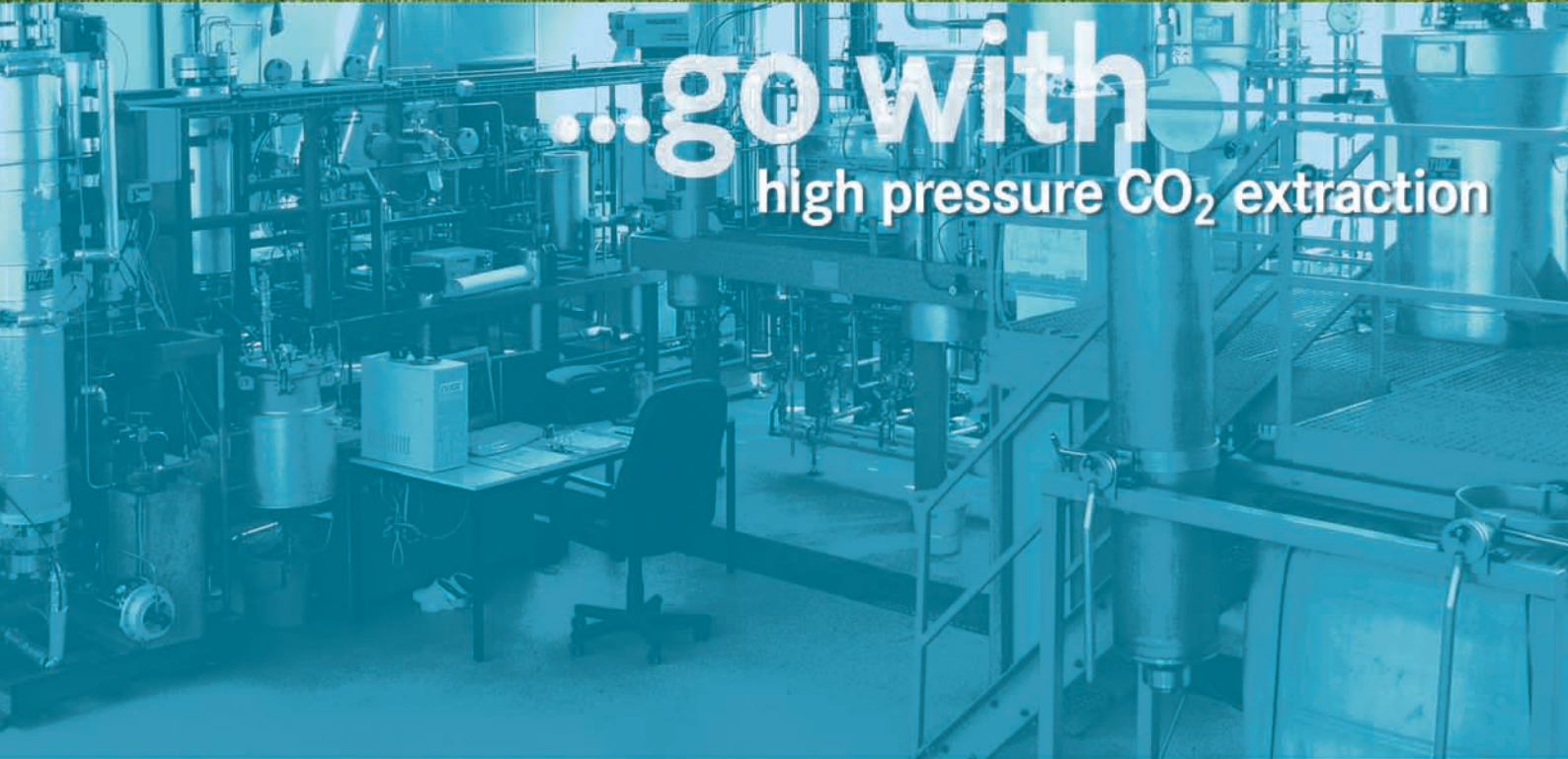




Go for nature...



...go with
high pressure CO₂ extraction



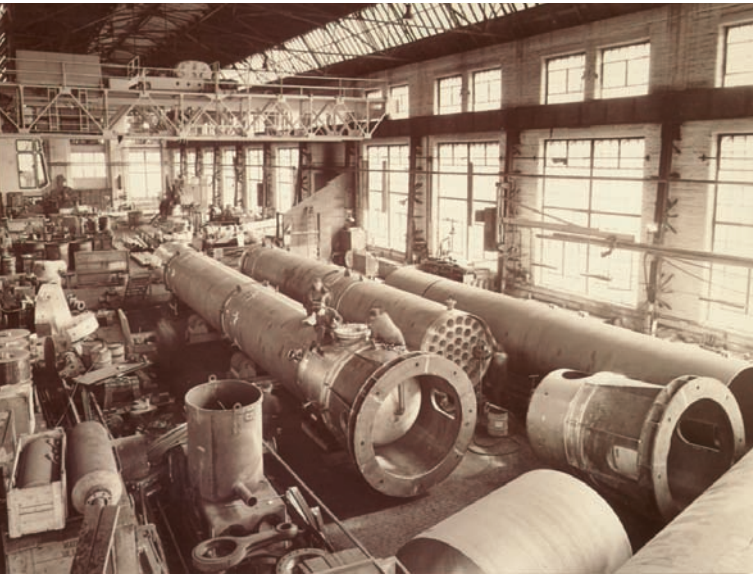
Where innovation... meets experience



> HISTORY



Schoeller-Bleckmann, Ternitz/Austria



First pilot plant - supercritical fluid extraction

NATEX is a follow-up of Schoeller-Bleckmann (SB) Process Technology Division, where more than 25 years ago industrial application of dense CO₂ gas technology was introduced. 1980 the first pilot plant was installed and R&D activities were started, so that process and product development as well as scale-up could be carried out in cooperation with the customers. Soon two large industrial projects with new isobaric processes for decaffeination of tea and decaffeination of coffee with continuous caffeine recovery were developed and realized for the first time worldwide.

1993 the experience, know-how, patents and pilot units were transferred exclusively to NATEX in the course of a management buy-out. The shareholders of NATEX are former key employees of SB Process Technology Division and INNOWELD. The close ties with INNOWELD, a well established manufacturer of high pressure equipment, were continued after NATEX was founded. This resulted in a unique combination of process know-how, equipment supply and provision of services for all applications of supercritical fluid technology.

RESEARCH and DEVELOPMENT



Ideas turn into R&D projects

> Our MISSION

High pressure CO₂ technology has several technical and environmental advantages and the products have health benefits compared to conventional processes. We believe these advantages should be utilized in as many industrial applications as possible.

The main focus of our mission is the industrial realization of ideas generated by our customers or resulting from R&D using the experience we have accumulated in many years. This materialization process leads to an optimized selection of technology and well-balanced process and mechanical design.



Quick-acting closure

> STRENGTHS of NATEX

Ideas of our customers and results from research projects are tested in our lab unit (5 liters/1000 bar) and pilot plant (80 liters/550 bar). Then scale-up is carried out to determine yields and process parameters for industrial operation. In certain cases tests in existing large scale plants can be provided on a toll processing basis.

During this procedure also economical aspects are investigated, so that investment and operating costs can be optimized. In this way first applications worldwide are created through product and process development in close cooperation with the customers. Further steps in the realization process are engineering, design of components, construction and manufacturing. Installation, commissioning and training of operating personnel complete our services as a one-stop-shop.

For well-known applications standardized R&D units and commercial supercritical fluid extraction plants are available.

Our product range also includes particle generation plants (CPFTM – Concentrated Powder Form and PGSSTM – Particles From Gas Saturated Solutions) which are offered in standard sizes or as customized plants.

Standard sizes of supercritical fluid extraction plants and particle generation equipment are listed on the back cover.



Removal of undesired substances from cork with



Cork extraction plant in Spain

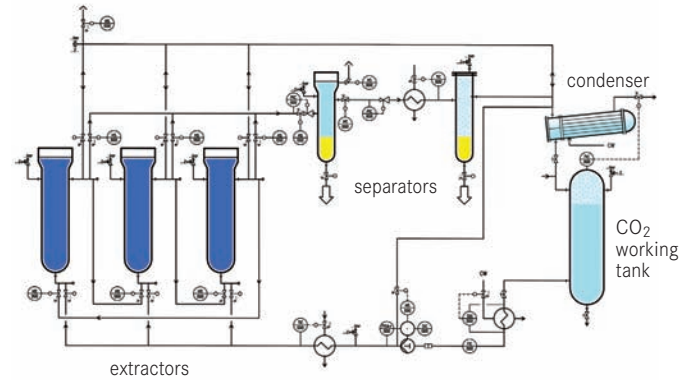
CO₂ TECHNOLOGY

> TECHNOLOGIES

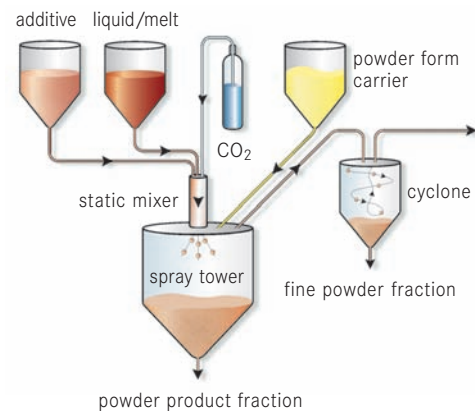
The high pressure extraction process is based on the principle that gases in a fluid state (above the critical pressure and the critical temperature) are able to dissolve larger quantities of natural substances than the partial pressure of the substance in the solvent would normally permit.

For many applications supercritical fluid extraction has several advantages compared to conventional processes. Botanical ingredients sensitive to high temperatures can be extracted smoothly and selectively. There are no solvent residues in the extract or the raw material. Fragrances and aromas remain unchanged. Pure extracts are achieved with fewer process steps. The extraction agent CO₂ is recycled and does not cause any environmental problems.

The food, cosmetics and pharmaceutical industries are the main users of ingredients extracted with supercritical CO₂, but new applications and new processes are developed and realized continuously like thin film extraction, particle formation, impregnation, cleaning of metallic parts, dyeing and cleaning of textiles, removal of undesired substances, chemical reactions and crystallization. In several of these new application fields research projects have already been carried out by NATEX, which guarantees that trends are not only monitored but converted into leading technology from Austria.



Scheme of a supercritical fluid extraction plant

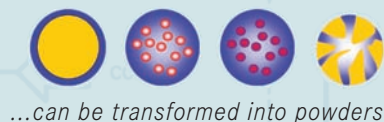


Scheme of a particle generation plant

PGSS™- Particles from Gas Saturated Solutions
CPF™- Concentrated Powder Form



Extracts produced by supercritical fluid extraction



...can be transformed into powders



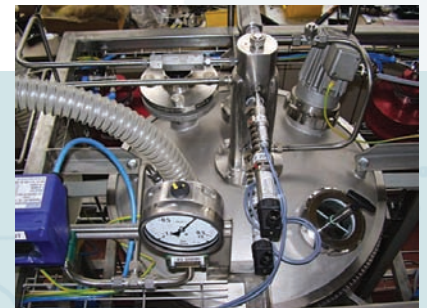
Cooperation for the Advanced Production of Innovative Solids

> MANUFACTURING

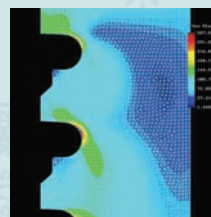
Engineering services provided by NATEX are complemented by the manufacturing abilities of INNOWELD, a company renowned for the supply of high pressure apparatus, components and fittings for industrial scale plants according to all main international norms and standards. Turn-key projects can be realized to the full satisfaction of the customers as a result of the combined efforts of the two specialized companies.



Transport of an extractor



Powder generation plant



Finite-element calculation



Certificates of INNOWELD



SPAIN

ITALY

GERMANY

DENMARK



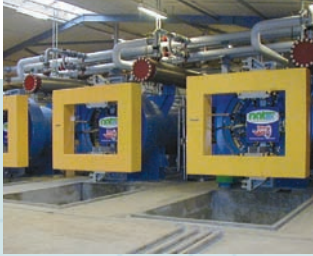
Cork purification plant



Coffee decaffeination plant
Supplied under Schoeller-Bleckmann



Tea decaffeination plant
Supplied under Schoeller-Bleckmann



Wood impregnation plant

CORK



COFFEE



TEA

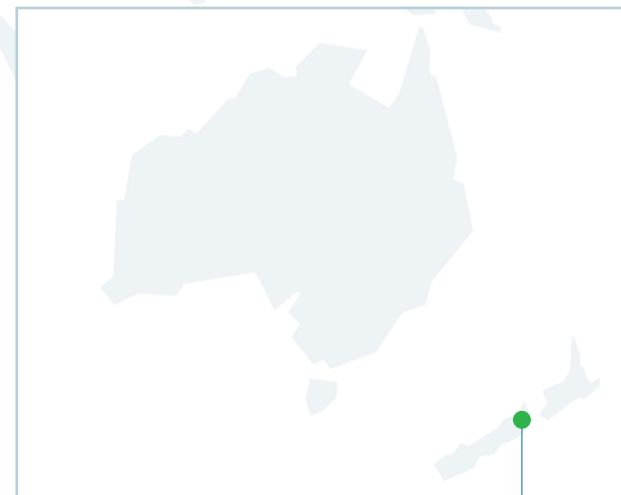


WOOD



> REFERENCES

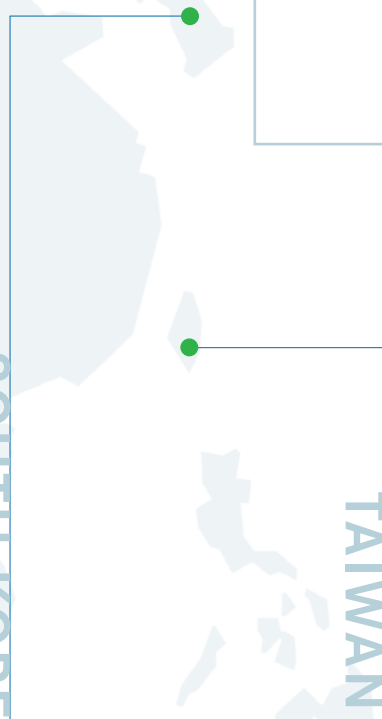
NATEX has supplied standard and customized supercritical fluid extraction plants to many parts of the world. Small, medium and large plants (up to several m³ extractor volume) were realized. In some cases applications were implemented on a large scale for the first time. In this way NATEX has established itself as a partner for key industrial projects worldwide.



NEW ZEALAND



Extraction plant for hops and nutraceuticals



SOUTH KOREA

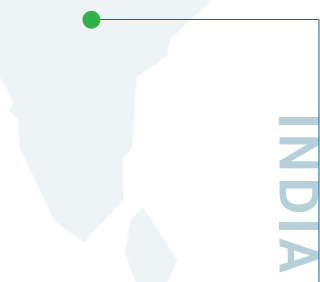
TAIWAN



Rice treatment plant



Edible oil extraction plant



INDIA



Extraction plant for spices and herbs

CHILI



SESAME



RICE



HOPS



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NATEX - office building

STANDARD SUPERCRITICAL FLUID EXTRACTION PLANTS

R&D units up to 1000 bar

net volume: 2 liters, 5 liters, 10 liters

Pilot units up to 700 bar

net volume: 50 liters and 100 liters

Commercial plants up to 700 bar

net volume: 200 liters and 300 liters

Industrial plants up to 550 bar

net volume: 600 liters, 800 liters, 1250 liters,
 2500 liters and 3500 liters

A plant may have one, two or three extractors and two separators for fractionation.

Option: Co-solvent system

STANDARD PARTICLE GENERATION PLANTS

CPF™ (Concentrated Powder Form)

PGSS™ (Particles from Gas Saturated Solutions)

Plant Type	PGSS™ Process Capacity kg/h	CPF™ Process Capacity kg/h
A	15	25
B	30	50
C	50	80
D	100	160
E	200	320
F	300	500
G	500	800

Plants can be supplied for one or both processes.



Supercritical fluid extraction Industrial plant, 3 x 850 l/550 bar



Supercritical fluid extraction R&D unit, 5 l/1000 bar



Particle generation plant up to 80 kg/h, up to 350 bar