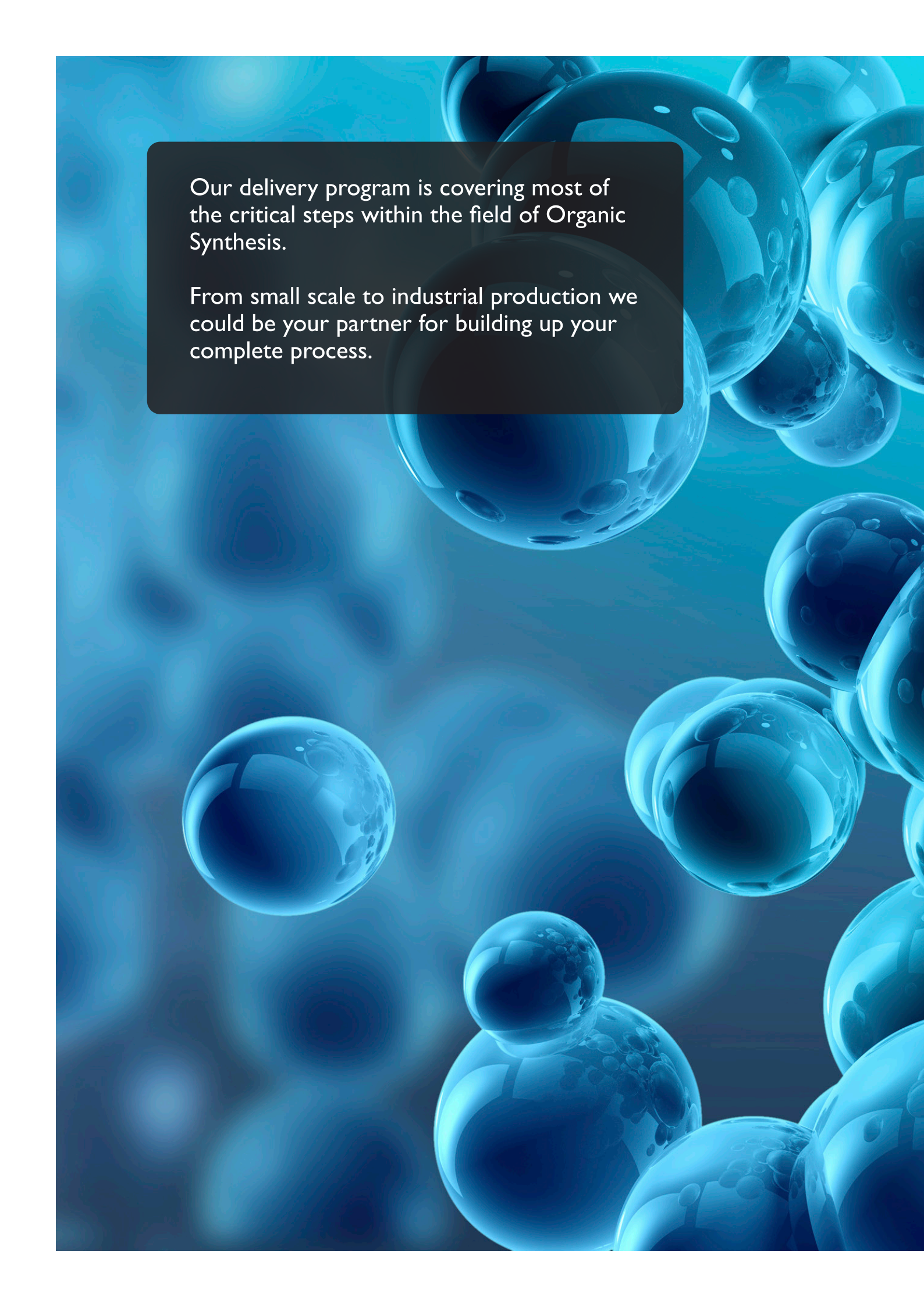




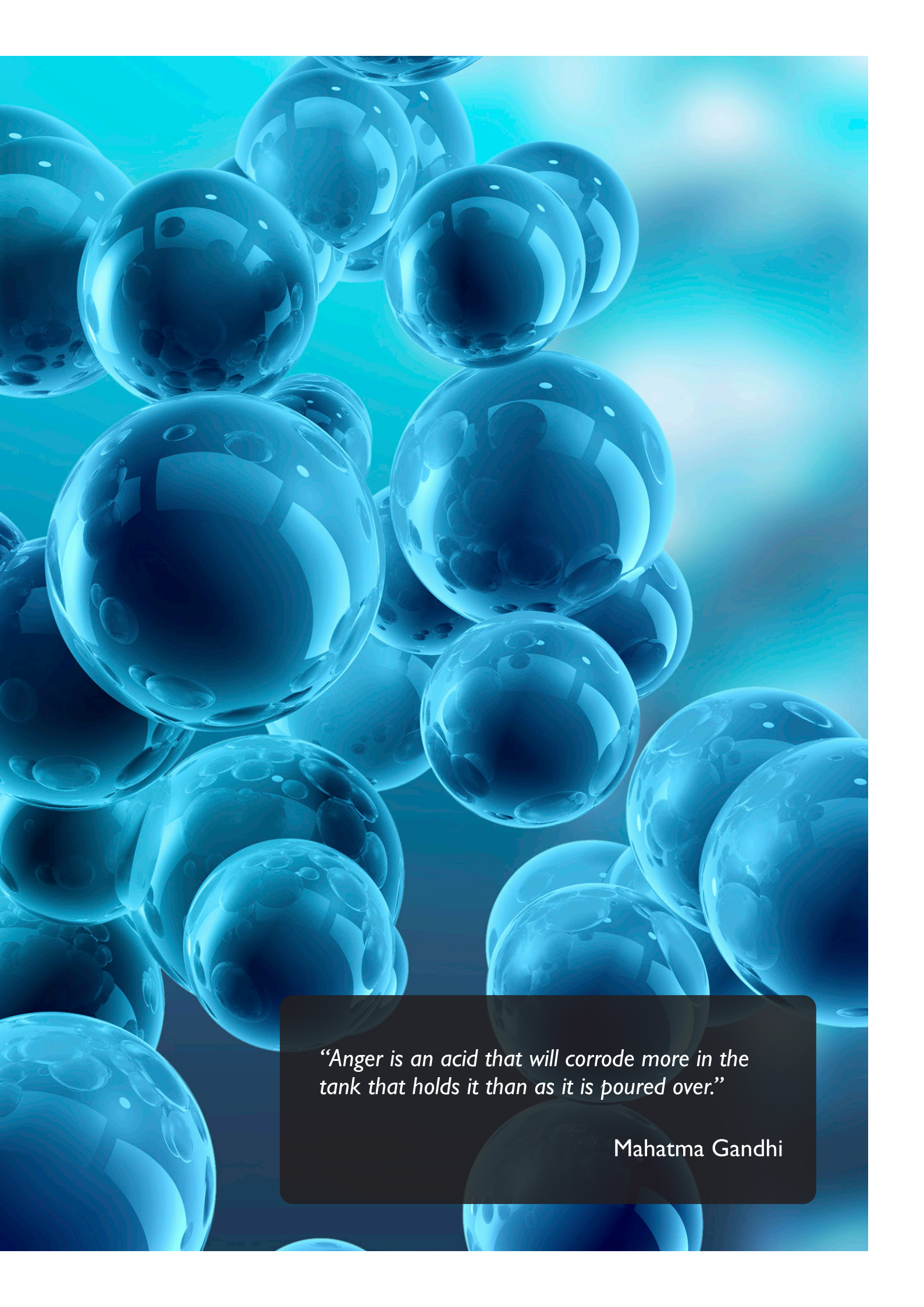
**FINE CHEMICAL**

Thurne

The background of the entire page is a vibrant blue gradient. It is populated with numerous translucent, 3D-rendered spheres and bubbles of varying sizes. These spheres are scattered across the frame, with some appearing in sharp focus in the foreground and others fading into a soft blur in the background, creating a sense of depth and movement. The lighting on the spheres is soft and diffused, highlighting their smooth, glass-like surfaces.

Our delivery program is covering most of the critical steps within the field of Organic Synthesis.

From small scale to industrial production we could be your partner for building up your complete process.



*“Anger is an acid that will corrode more in the tank that holds it than as it is poured over.”*

Mahatma Gandhi

# Reactor Environment



## GLASS REACTORS & REACTOR SYSTEMS

Borosilicate glass is transparent, corrosion resistant and catalytically inert and has a smooth and easily cleaned surface. These features make the material well suited for synthesis of fine chemicals and API's.

### Technical details:

Reactor size from 1 to 630 L (with glass or glass-lined reactor bottom part) available either as stand-alone unit or as complete skid mounted system with ATEX certification and CE labeling.

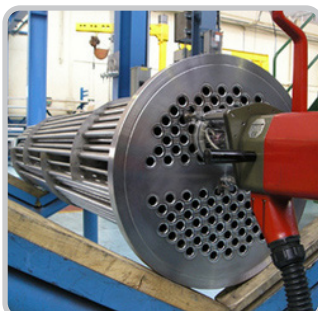


## GLASS-LINED AND METAL REACTORS

With a glass-lined reactor, the transparency is lost and instead pressure resistance is gained. Other materials such as steel alloys or reactive metal solutions (Ti, Ta, Zr) can be offered.

### Technical details:

DIN range of glass-lined reactors of type AE, BE and CE covers nominal sizes from 63 L to 40 m<sup>3</sup> and OPX (Optimix) range with three integrated baffles covers the same size range. Metal reactors are flexible in size and design.



## CONDENSERS

The heat exchanger acting as condenser has an important role either if it is for reflux, evaporation or condensing vapors in ventilation gas.

### Technical details:

A wide range of condensers for GMP environment such as Shell & Tube, Welded Plate, Spiral, or Block type is available in the widest range of materials: Tantalum, Ni-alloys, Steel Alloys, SiC, Graphite, Glass and Glass-lined Steel.



## CONTINUOUS REACTORS

Transforming batch processes of chemical reactions into continuous operated systems serves numerous distinctive advantages, such as improved safety, reduced manpower, constant product quality and maximized space-time yields.

### Technical details:

From Mini production Plants up to full scale production units in a wide range of materials.



## TEMPERATURE CONTROL UNITS

A complete, turn-key stand-alone unit for heating/cooling applications in which the unit operates with a single heat transfer fluid and monitors and controls the temperature of the process.

### Technical details:

Available from heating and cooling capacities from 1 kW and upwards covering temperature ranges between -100°C and +400 °C working with either water based or oil based heat transfer fluid.

# Solid/Liquid Separation & Drying



## CENTRIFUGES

Mechanical separation of solids from a liquid phase is a common unit operation and a centrifuge with a filter media cloth offers a way of doing so with efficient washing of the product cake and high throughput.

### Technical details:

Continuous operation with a pusher centrifuge or operation in cycles with a vertical or horizontal peeler machine or a horizontal pharma centrifuge.



## FILTER/DRYERS

With functionality for heating/cooling, motor driven height adjustable agitator and dust filter connected to vacuum source, the pressure filter is turned into a filter/dryer machine with combined filtering & drying.

### Technical details:

Available in nominal filter area sizes between 0.03 and 16 m<sup>2</sup> and made of Steel Alloys, Ni-Alloys or Glass-Lined Steel.



## HELIX DRYER

For gentle thermal processing under vacuum at moderate temperatures. Gentle mixing by upwards conveying along the heated vessel wall by the helix and then down flow by gravity in the center of the vessel.

### Technical details:

Available from laboratory and pilot scale to production in nominal volumes from 8 to 10000 L.



## BICONICAL ROTARY VACUUM DRYERS

The design of the conical dryer combines the drying and mixing function in one simple and stable device with drying times at acceptable levels.

### Technical details:

Available in nominal volumes between 100 and 10000 L and made of Steel Alloys, Ni-Alloys or Glass-Lined Steel.



## GAS & LIQUID FILTRATION

A comprehensive range of filtration solutions from clarification to pre-filtration in different media and media combinations. Typical applications are filtration of gas and liquid raw materials, removal of catalyst and liquid product filtration before final crystallization.

### Technical details:

Filter capsules and cartridges in a wide range of different pore sizes and surface areas with different connection types or end cap codes.

# Containment



## REACTOR CHARGING

To charge a reactor with powder in a safe and contained way is a challenge when using solvents in pressurized vessels. By using a PTS this operation could be handled in a closed and safe way from all kinds of powder containers into a reactor even under operation.

### Technical details:

Capacities from less than 1 kg up to 9 tons per hours. As there is no risk of solvents to reach the PTS body it is usually supplied in Stainless Steel but can be supplied in other materials.



## SPLIT BUTTERFLY VALVES

A Split Butterfly Valve (SBV) provides a dust-free and contained material handling out of an IBC into a process vessel and vice versa.

### Technical details:

These valves are operated either manually or automatically and are available from diameter 50-300mm. Product touching parts (are executed) from stainless steel 316L, alloy or even high-grade plastics and quality sealings. Its High-Containment performance is OEL <math><1 \mu\text{g}/\text{m}^3</math> (acc. SMEPAC guidelines).

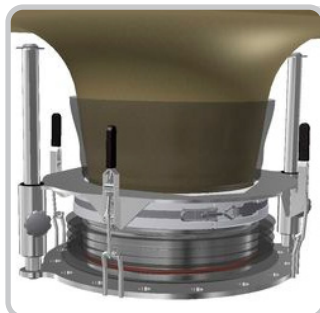


## FLEXIBLE CONTAINED PRODUCT TRANSFER

With the development of the SafePort Bag, we placed the highest priority on easy handling, high working safety, universal usability and quality. The design of the SafePort Bag avoids product loss, thus ensuring a high yield of your products.

### Technical details:

With the SafePort Bag, we offer a cost-effective oneway option for a secure transfer with OEB 5 (<math><1 \mu\text{g}</math> per



## FILLING & EMPTYING STATIONS

Contained and dust-free handling of bags and drums, containing ingredients or intermediates, improves not only the operators' safety but also protects the product and improves the cleanliness of the facilities.

### Technical details:

For OEL's of <math><1 \mu\text{g}/\text{m}^3</math> and <math><10 \mu\text{g}/\text{m}^3</math>, different type of isolator systems and contained connection systems are available for bag, drum and big-bag emptying. As filling equipment, we can offer isolators or efficient endless-liner filling stations. Big-bag filling stations are available at different levels of containment.



## IN-LINE MILLING AND SIEVING

Milling, micronizing and security screening of wet or dry ingredients and products is possible to do in a contained way, minimizing dust and product exposure by using our in-line cone mills and sieves.

### Technical details:

The mills/sieves can be connected with split valves or placed directly in-line for active transport through the equipment with vacuum transport systems. Capacities from 1 kg/h to 100 t/h.

# Systems, Service & Safety



## REACTOR SYSTEMS

Complete turn-key skid mounted systems which are assembled and tested before delivered to customer site and delivered together with CE marking/labeling in accordance with machine directive, PED and ATEX as well as complete documentation file. Available from reactor nominal volumes from a few L and upwards and customized solutions around the reactor/reactors.



## EXHAUST GAS PURIFICATION SYSTEMS

Solvent condensation units or scrubber systems for absorption of acidic gases, NO<sub>x</sub> and other applications are available. Standard mobile scrubber systems made of glass in smaller size and customized solutions for other materials and larger sizes.



## INSPECTION OF STATUS OF ENAMEL

Glass-lining is controlled visually and by using Quick Glass Test, which works with the principle of measuring a leak rate of current that depends of the size of the glass failure. Test results and observations are compiled in a formal inspection report issued by Thurne Teknik.



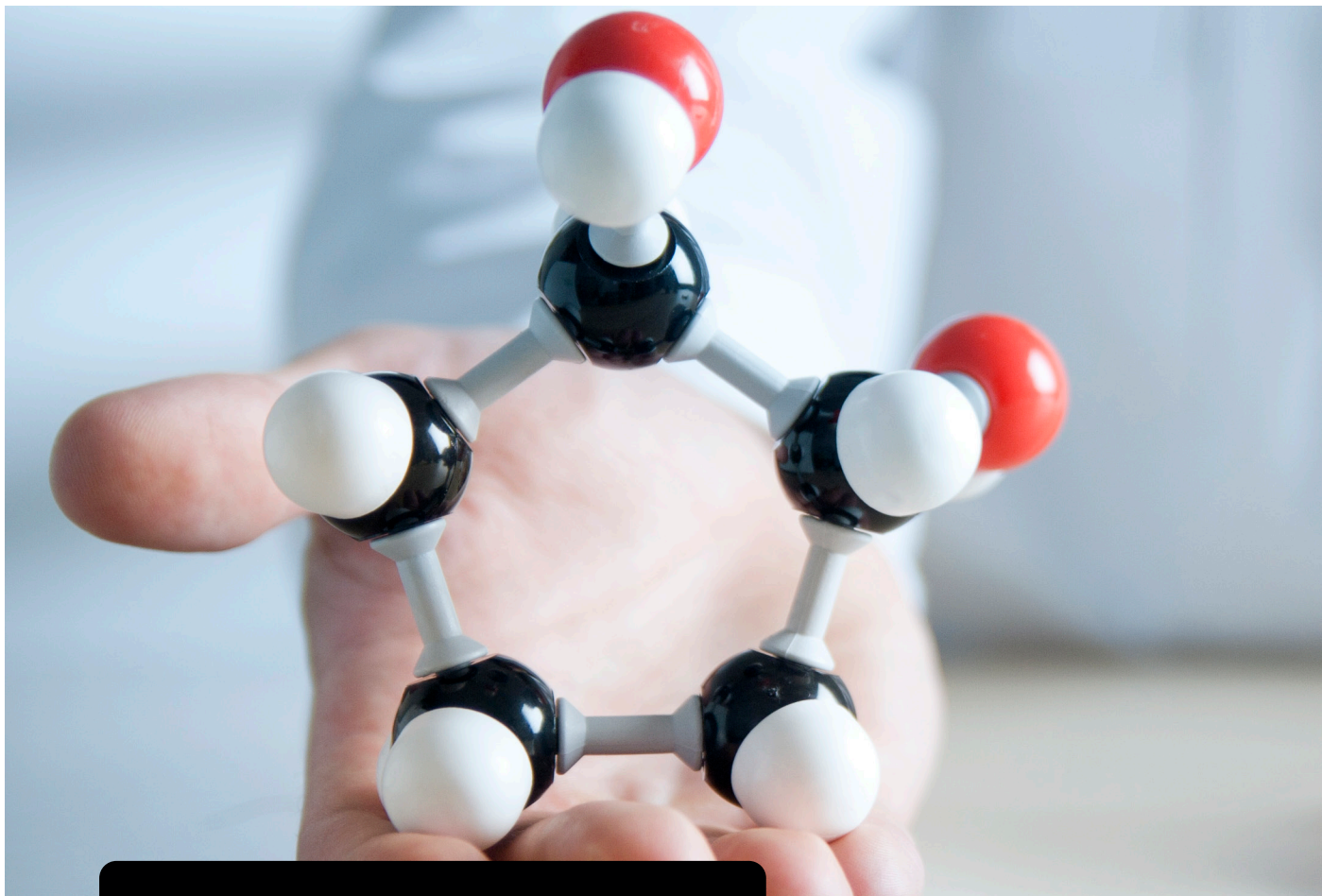
## COURSE FOR USERS OF GLASS-LINED EQUIPMENT

The target group for the course consists of users of glass-lined equipment, i.e. process operators, process engineers and maintenance staff and the program takes half a day to cover. This is done by explaining what enamel is, how glass-lined equipment is manufactured and practical advice by using examples from reality.



## SAFETY DAYS / SAFETY AUDIT

We can provide a free of charge audit at your site to make a report on all rupture disc applications in order to verify that the right type of rupture disc is chosen for each application. This audit also includes training for your staff in rupture disc technology and contains guides for the design of safety systems.



# SUPPLIERS

## Fine Chemical

Thurne

Some equipment may not be available from Thurne in certain geographical areas.

## A network for life.

Since the start of the company we have been focusing on API (Active Pharmaceutical Ingredient) & Fine Chemical Applications with reactors being the heart of the product line.

As the environments often are corrosive, our range of material is one of the most complete you can find: 316L, Tantalum, Glass lining, Borosilicate Glass, Nickel Alloys, Graphite, PTFE, other metal alloys and plastics.

In the last years there has been a strong focus on containment issues for handling of hazardous powders. Therefore we have built up a complete program for all material handling in toxic environments.

Vers. 2021



Thurne Sweden  
Lugnets Allé 1  
SE-120 65 Stockholm  
Sverige

Thurne Denmark  
Ny Carlsberg Vej 80  
DK-1799 Copenhagen V  
Denmark

Thurne Finland  
Malminkartanonkuja 4  
FI-00390 Helsinki  
Finland

Thurne Baltic  
Artilērijas iela 3-20A  
LV-1001, Rīga  
Latvia

Thurne Poland  
Ul. Towarowa 35  
61-896 Poznań  
Poland

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