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www.thaletec.com

THALETEC Highlights

Innovative glass lining Technology
for the Chemical and Pharmaceutical
Industries Worldwide



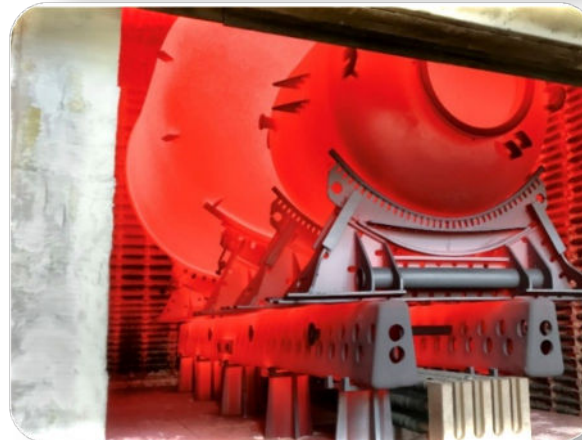
The Company

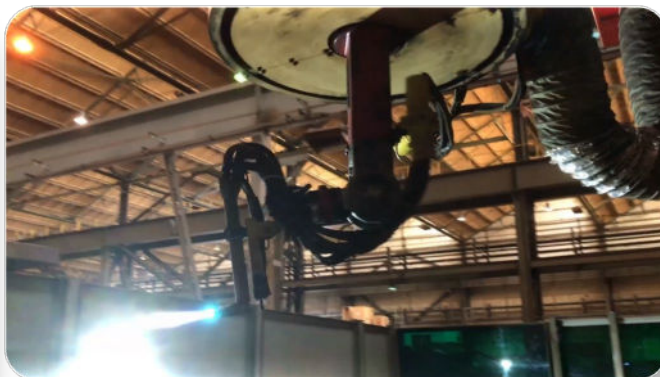
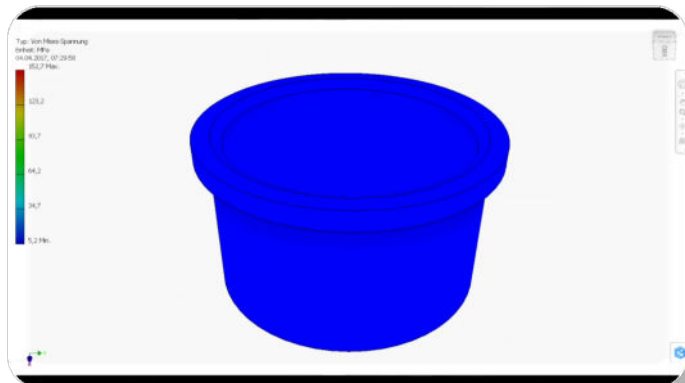
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- 1686 THALE Iron Works founded at the site
- Mid-1800 Glass enamelling of steel
- Early-1900s more than 4000 worked in producing a range of steel and glass-lined steel products including helmets
- 2007 Thaletec GmbH formed under new ownership of private investors
- Company HQ Thale, Sachsen-Anhalt
- Production area of 37.000 m²
(size of approx. 5 football fields)
- Approx. 200 employees
- 2021 Thaletec GmbH became a part of a HLE Glascoat, a BSE listed publicly traded company



- Better control over
 - Delivery dates
 - cost
- Flexibility to fulfil any customer wish

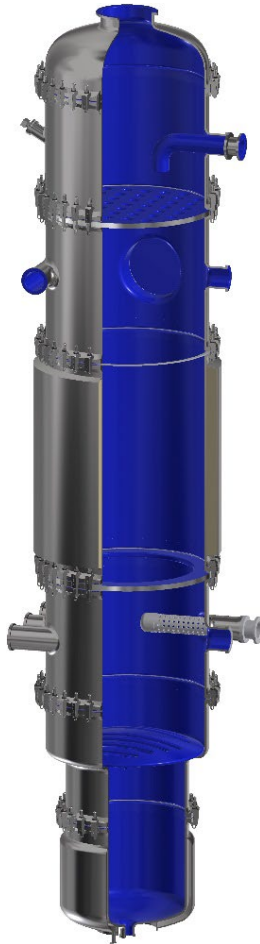




Glass-lined Steel Products

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- Reactors: 10,000 gal
- Storage Vessels: 25,000 gal
- Columns
- Pressure filters
- Glass-lined and SIC Heat-exchangers
- Special Equipment like Thin film Evaporator, Filter Dryer, Double Cone-dryer, etc

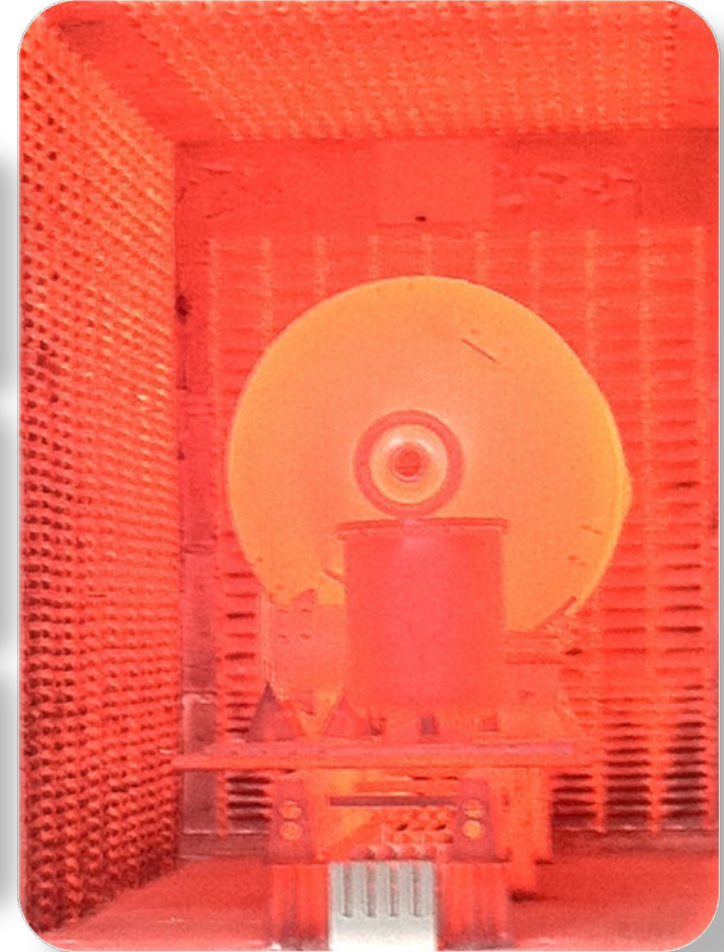


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Glass Linings

- Glass-lining is the fusion bonding of glass particles (or frits) onto a steel substrate
- The application is done in layers, in one of 2 ways:
 - spray (wet)
 - Electrostatic (dry)
- Each layer is about 10-12 mil thick
- The first two are primer-like ground coats and 4 more finishing coats are applied
- After each application of the slurry it is dried and fired at 1750 °F in a furnace
- This process is repeated until the glass layer is up to 70-80 mils thick



EmSelect – your fast track to the best glass-lining



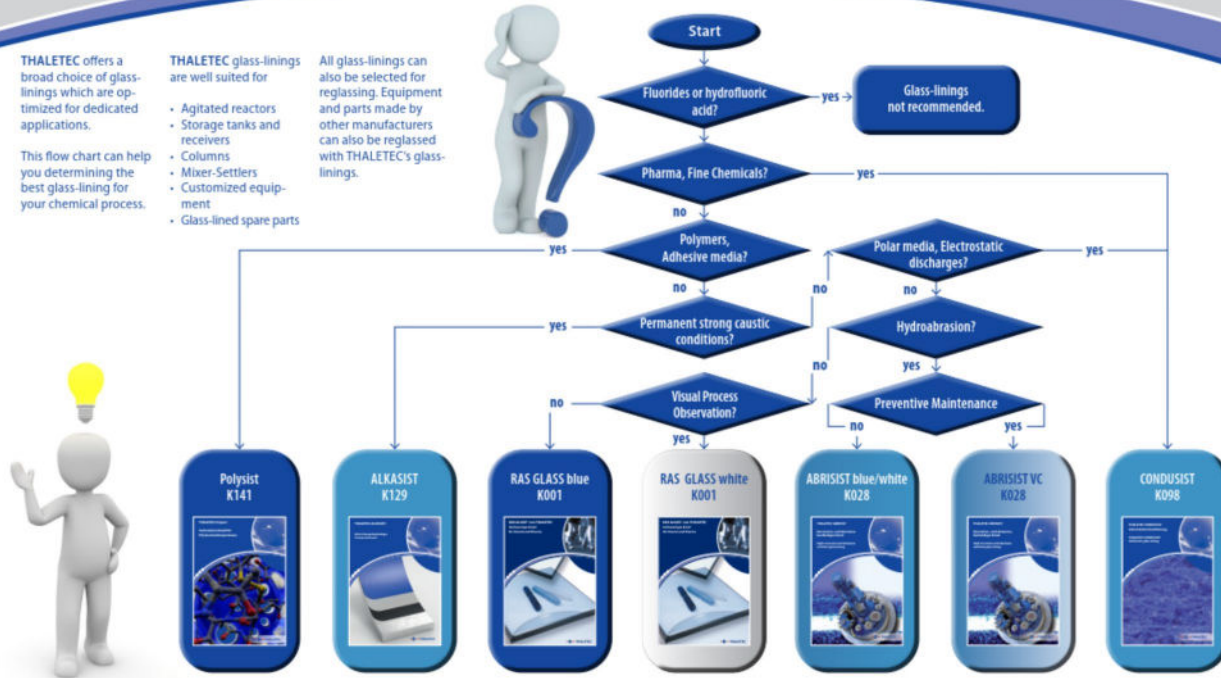
THALETEC offers a broad choice of glass-linings which are optimized for dedicated applications.

This flow chart can help you determining the best glass-lining for your chemical process.

THALETEC glass-linings are well suited for

- Agitated reactors
- Storage tanks and receivers
- Columns
- Mixer-Settlers
- Customized equipment
- Glass-lined spare parts

All glass-linings can also be selected for reglassing. Equipment and parts made by other manufacturers can also be reglassed with THALETEC's glass-linings.



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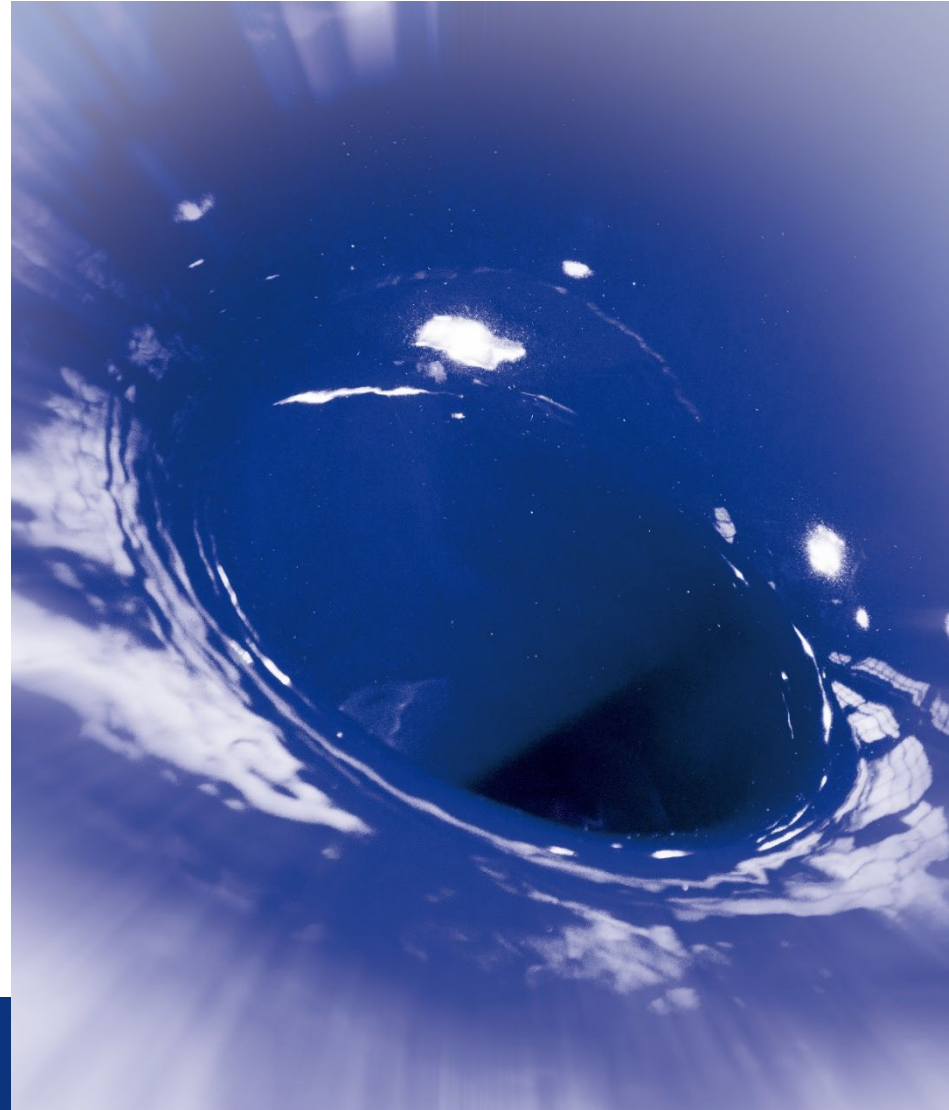
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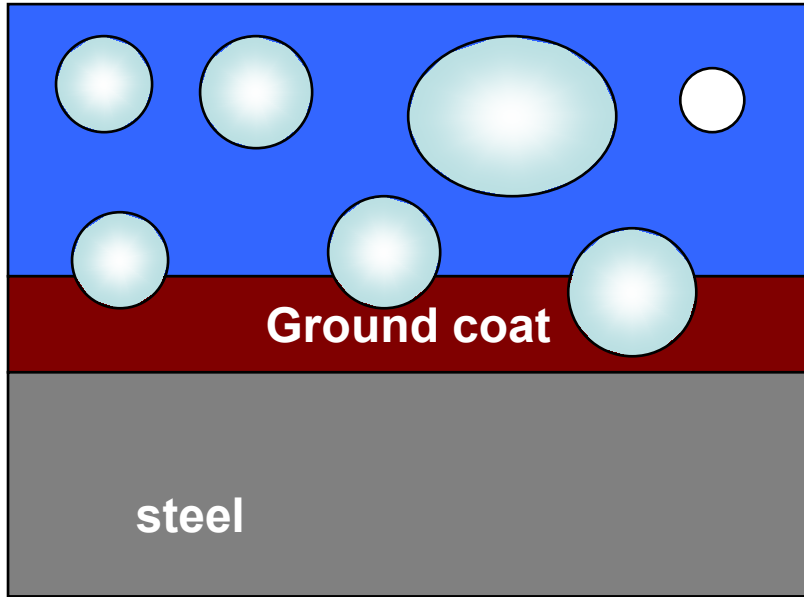


Detailed information can be downloaded from THALETEC's website (www.thaletec.com) after registration. The number of the applicable data sheet can be found in the flow chart (i.e. K028).

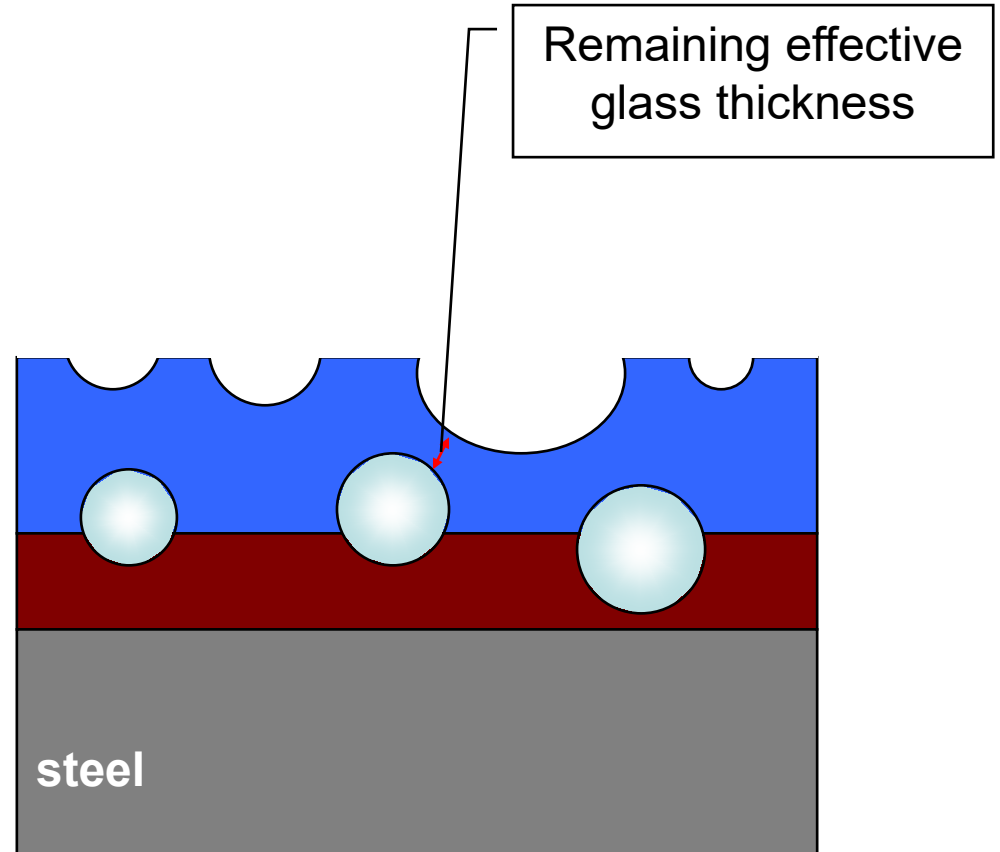
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- **RAS blue/white:** General purpose glass-lining for most applications
- **ABRISIST:** highly wear-resistant
- **ALKASIST:** for caustic processes
- **PolyGlass:** Glass-lining for polymerisation processes with anti-adhesive properties
- **CONDUSIST:** electrically conducting
- **THERMASIST:** thermally conducting





Before corrosive attack

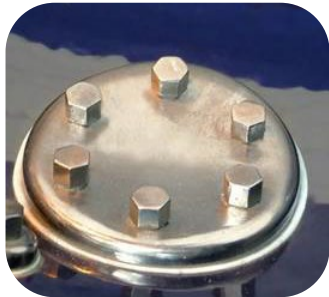
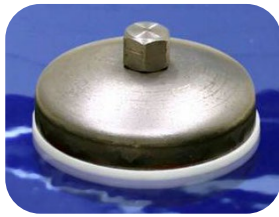
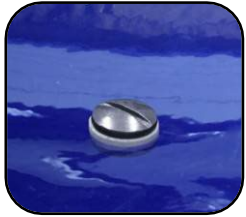


After corrosive attack

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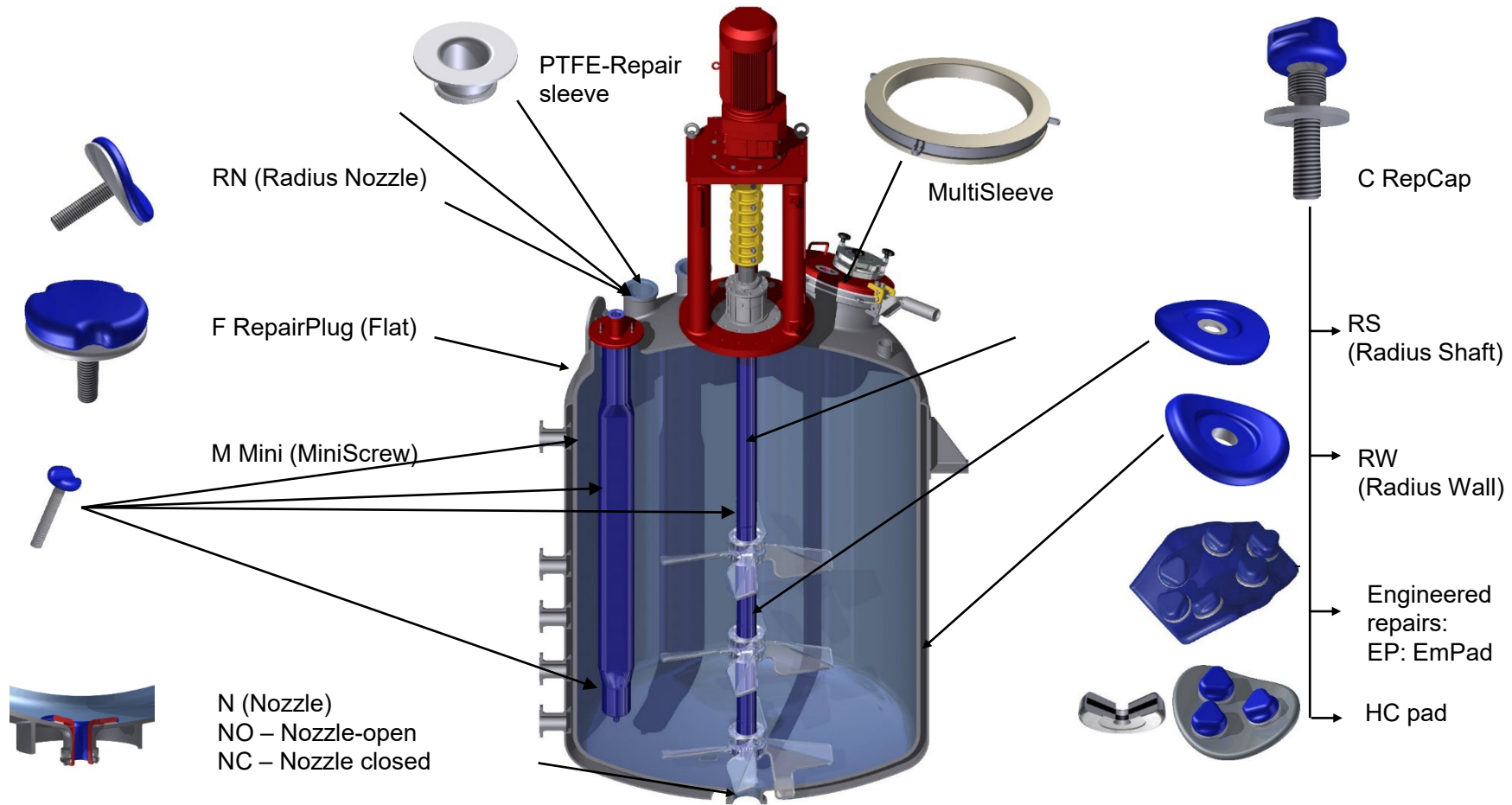
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Repairs



- Tantalum is ...
 - Expensive
 - Soft material with low strength and high deformation
 - A conflict material
 - A metal (not metal free)
 - Not compatible with glass lined steel (thermal expansion)
- Tantalum repairs require:
 - complex work
 - Experienced staff

Tantalum is a temporary repair!

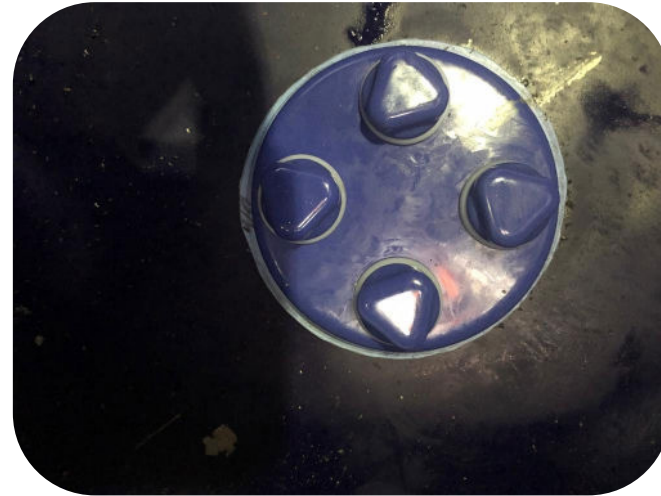
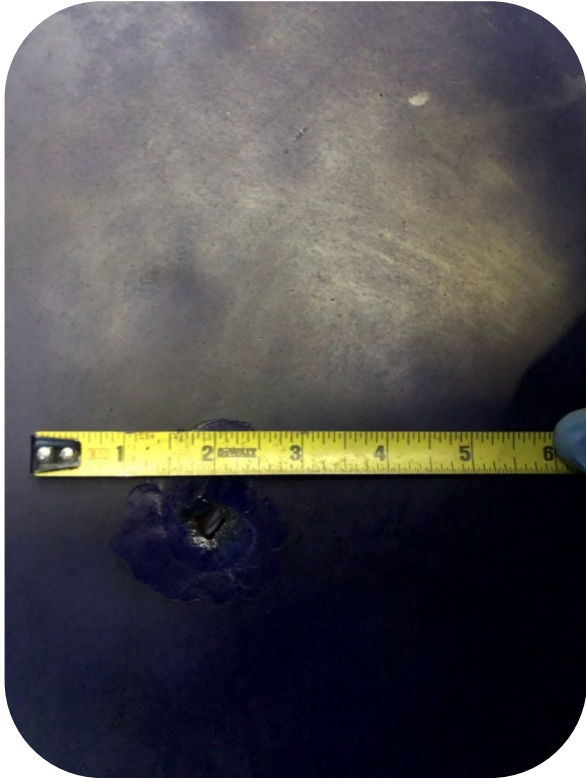




■ Contents:

- RepDiscs with gaskets sizes 100mm (2x), 70mm(2x), 50mm(2x) and 38mm (1x)
- THALETEC Sofiflex tape 3x2mm (35 ft.)
- RepCap with Bolts for Discs (17x)
- RepCap with Bolts for Cap (6x)
- Gasket RepCap for Cap (6x)
- Gasket RepCap (Gylon blue) (23x)
- Tool for RepCap (1x)
- Pump for tightness check (1x)

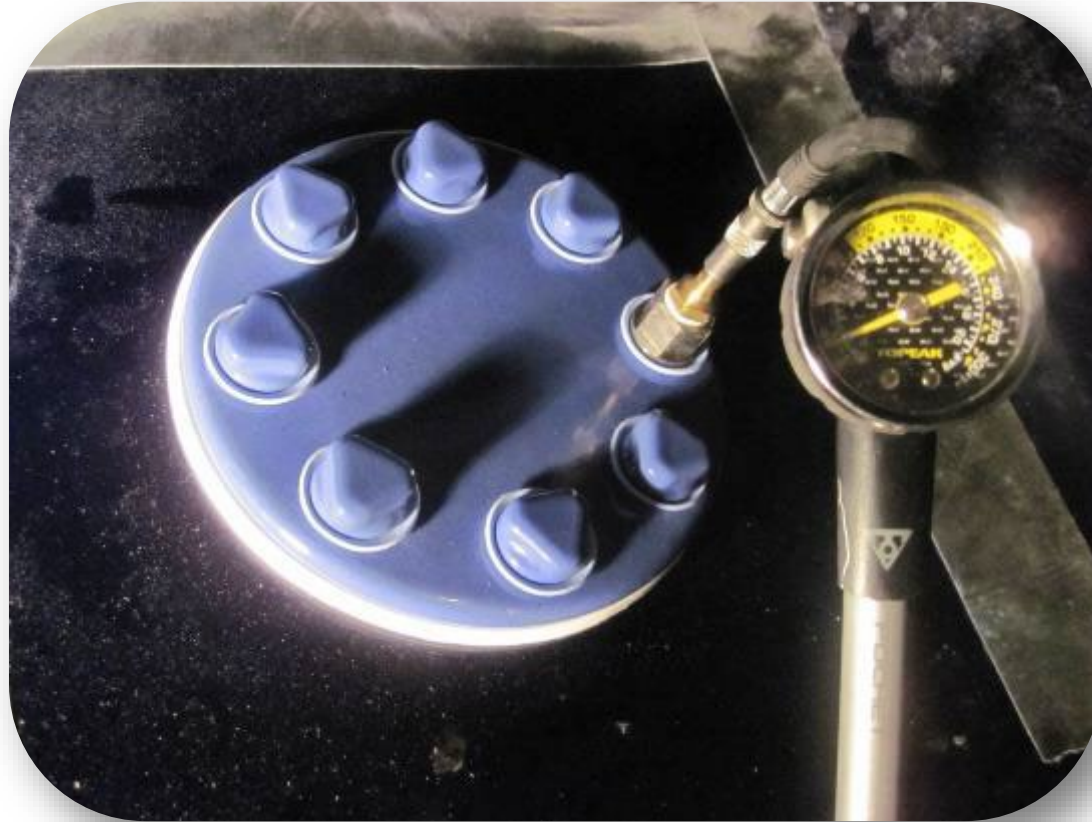
- Damage on lower dish on a 500 gal reactor

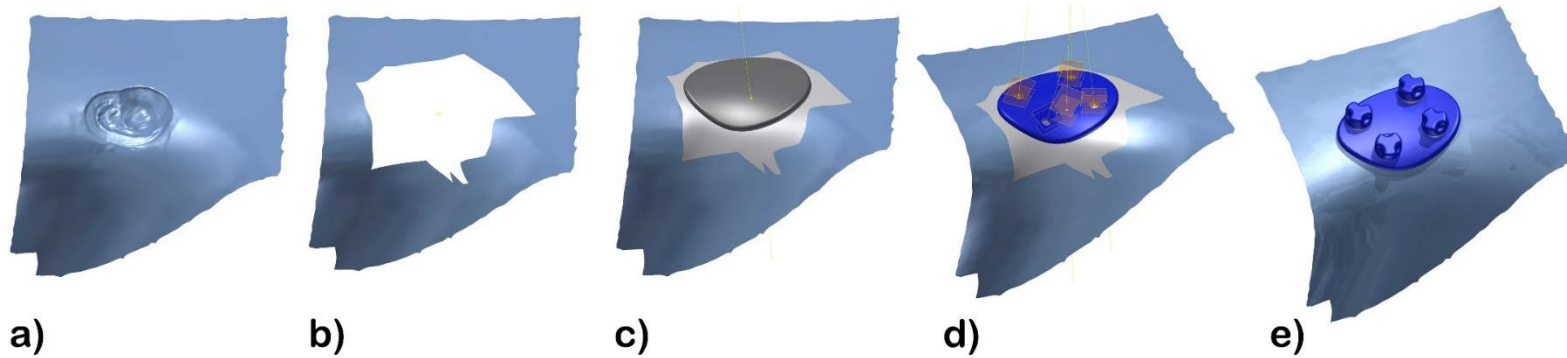
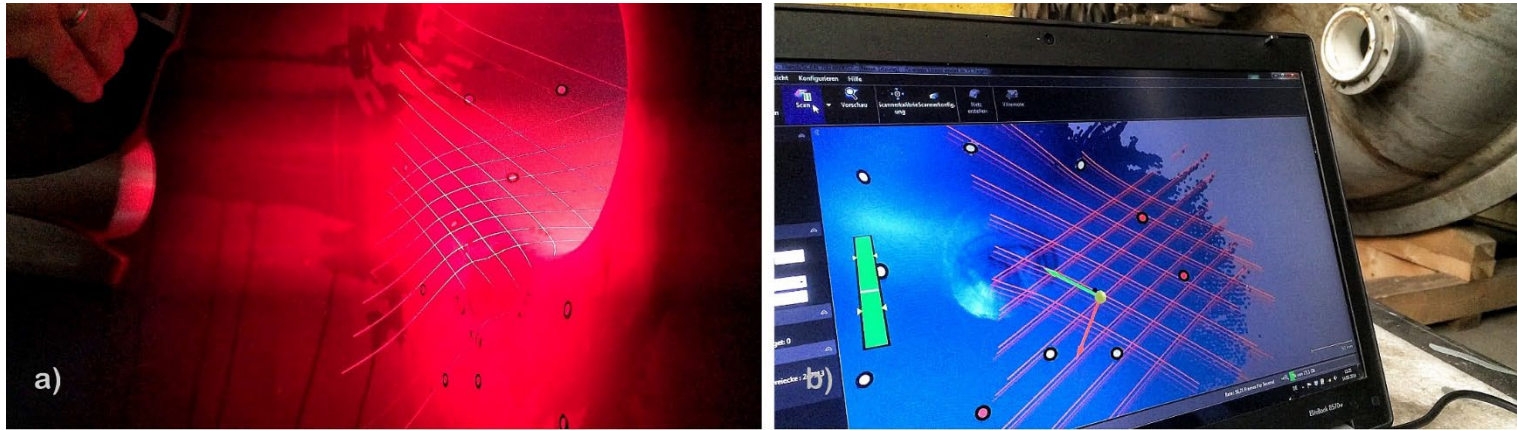


Repaired with a 4 inch standard patch on same day

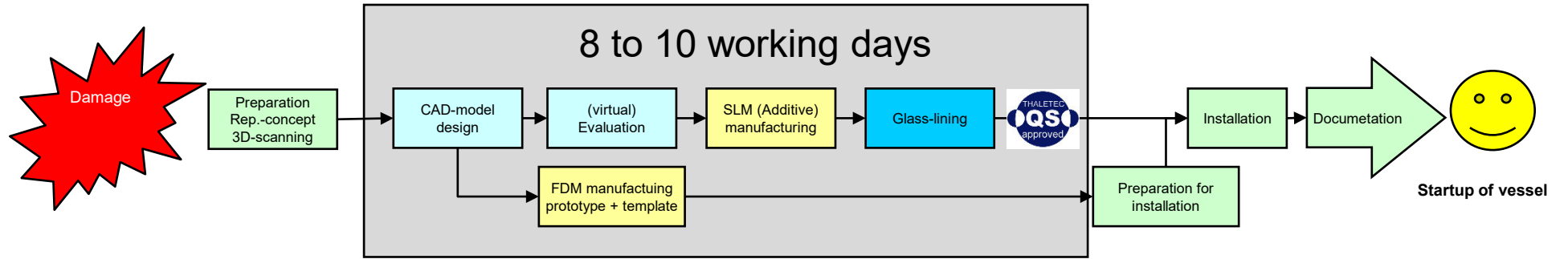
Leakage test of a patch

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Workflow engineered patch



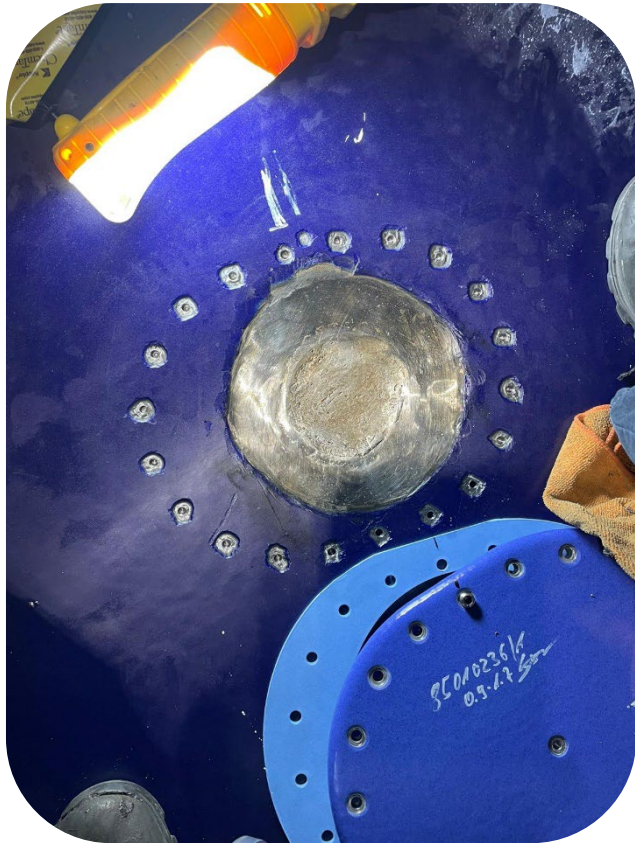
On site

THALETEC Engineering

THALETEC

THALETEC glass-lining

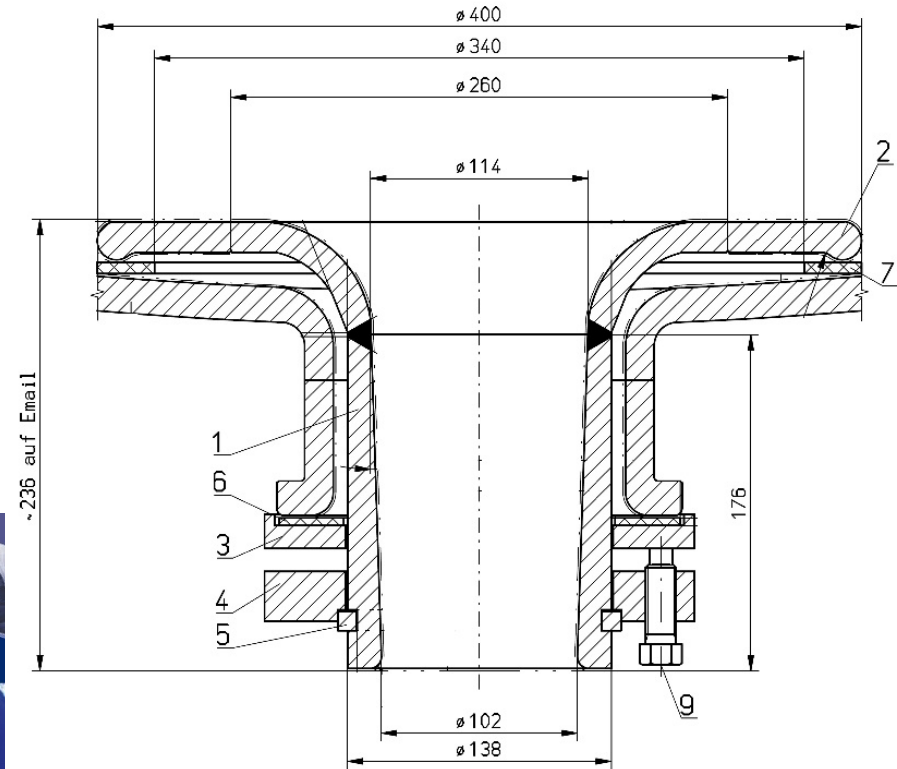
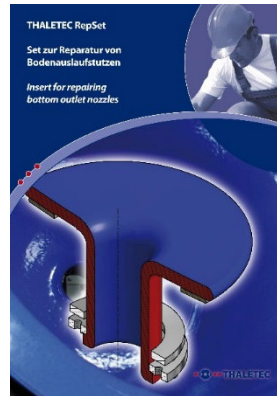
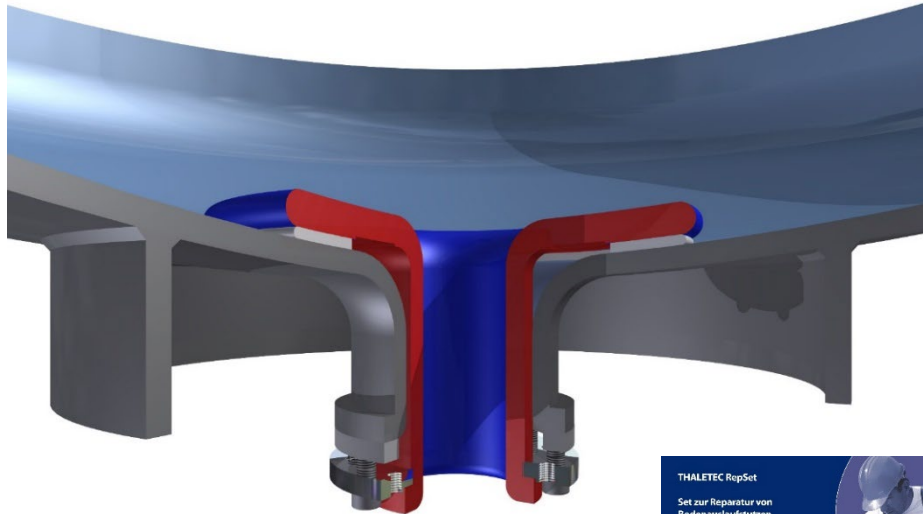
Example of larger patch



assembly



pressure test

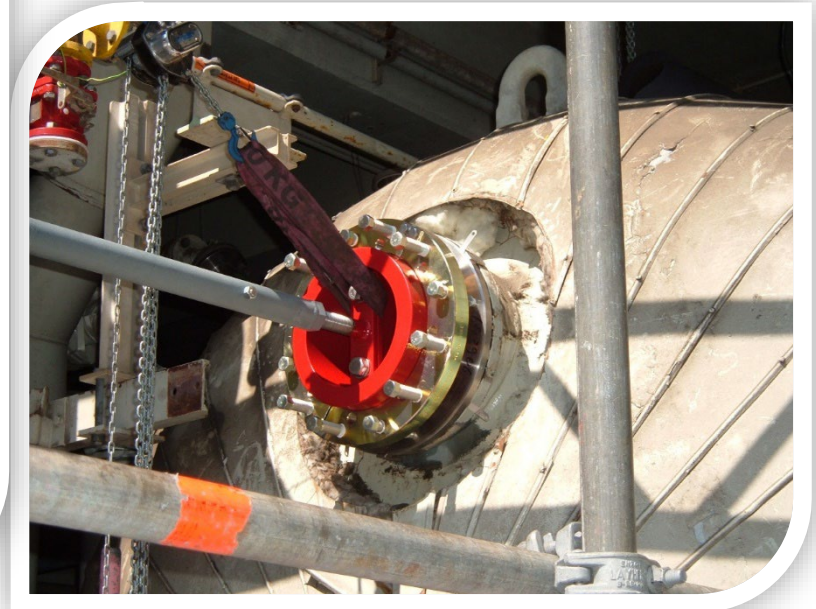




Nozzle Replacement



Nozzle Repair



PTFE repair-sleeves

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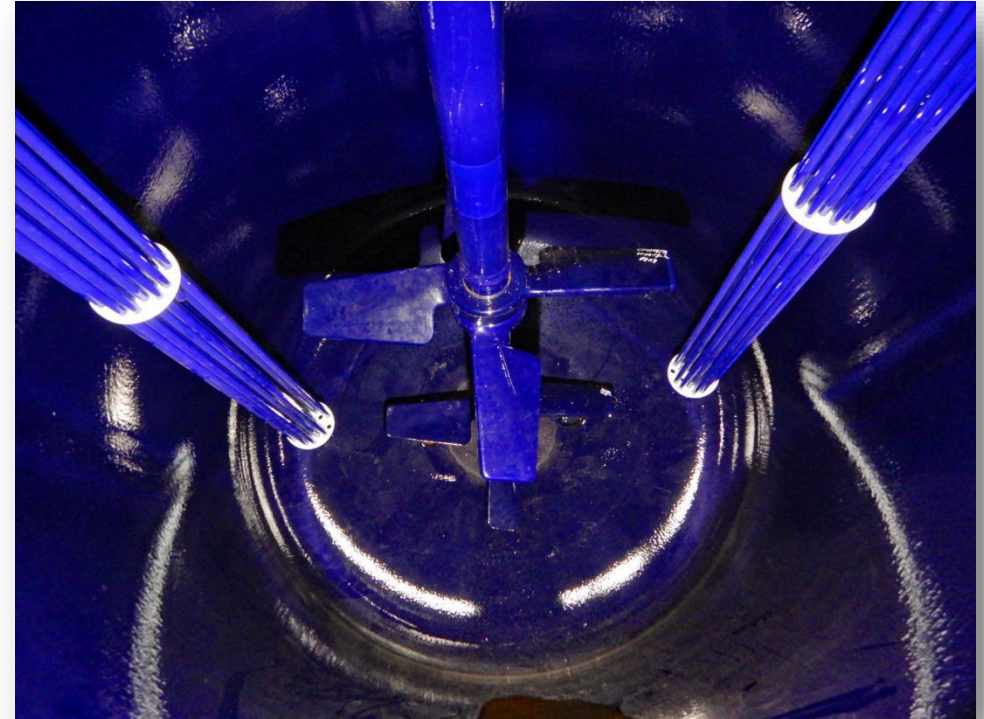


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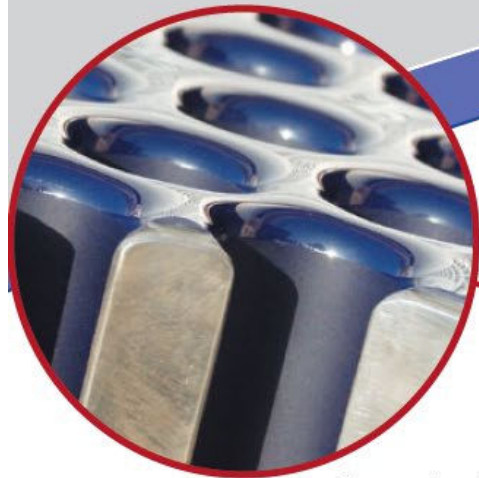
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Heat Exchanger / Powerbaffle

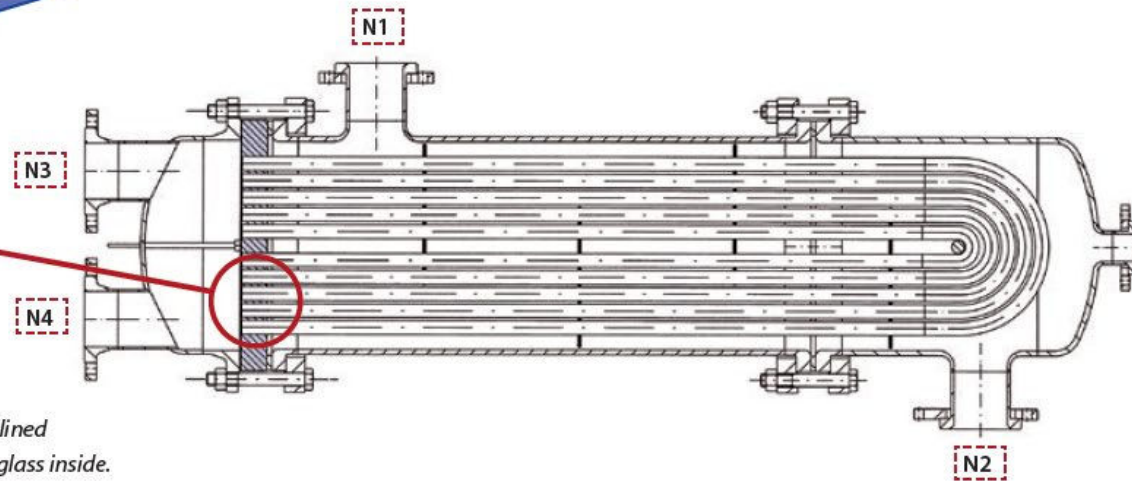
- THALETEC PowerBaffle **replaces the standard baffle**
- significant increase of the available heat exchange area
- Gain in **productivity**
 - shortening of heat and cooling time (shorter batch time)
- Optional with integrated **temperature measurement** at the lowest possible point in the reactor



Glass-lined U-tube bundle heat exchangers WTU and PowerBaffle



Cross-sectional view of a glass lined tubesheet note the machined glass inside. The gasket-free tube/tubesheet connection guarantees perfect fitting



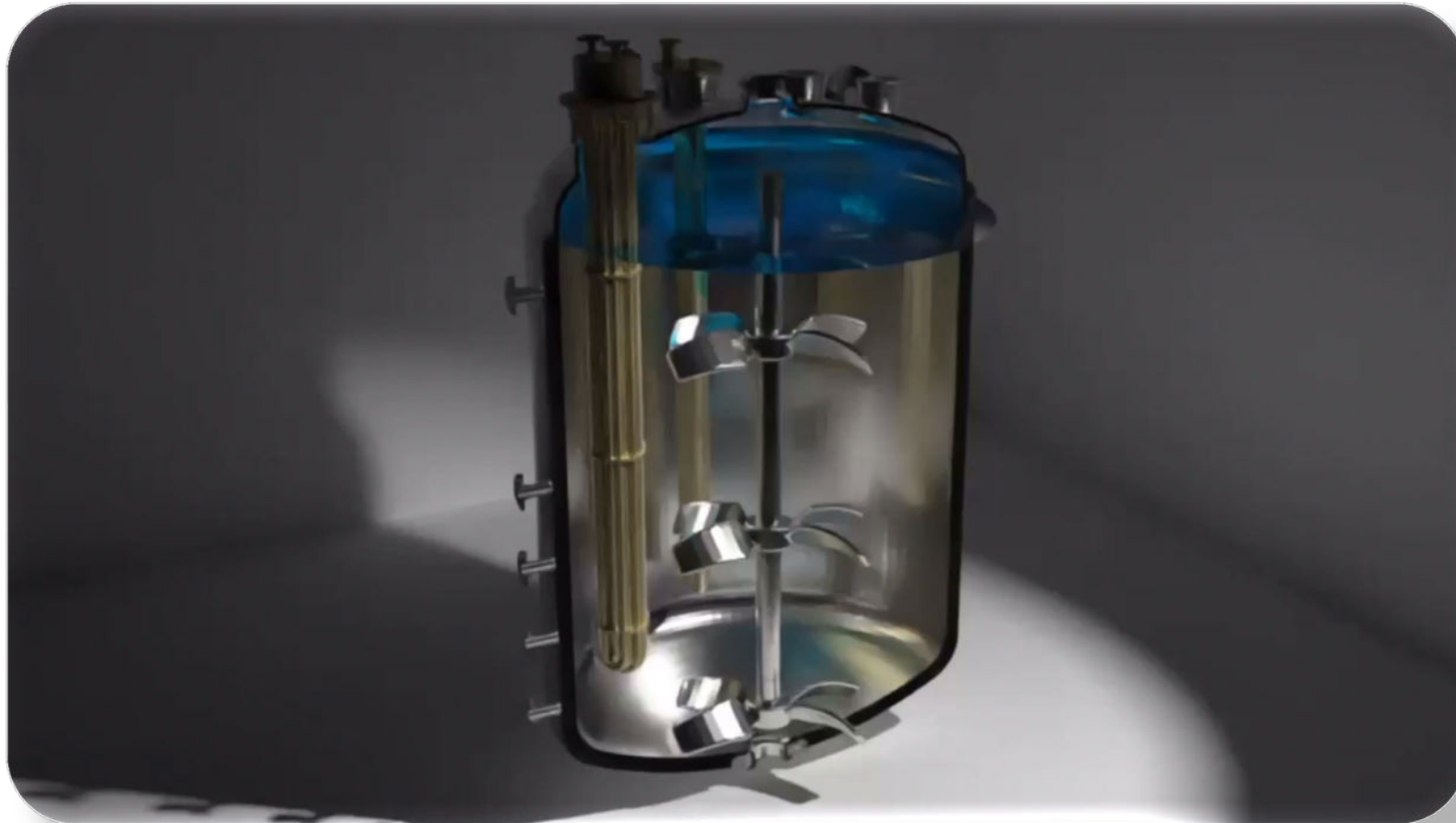
Glass lined U-tube bundle heat exchanger installed in horizontal position

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Mixing





Innovative Mixing Technology for glass-lined reactors



Glass-lined Turbines from THALETEC

Classification of turbine properties: low medium high

Radial Flow Turbines

CRK (Curved X-shaped Impeller)
CRK (Curved X-shaped Residual) K024

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Gases, Suspension, Dispersion, Multiphases, Heat transfer, Residual (CRK)

FRT (Flat Blade Turbine)

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Gases, Dispersion, Heat transfer

RCI (Retreat Curved Impeller)
One piece Impeller or splitted Impeller

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Gases, Dispersion, Heat transfer

RCIcw (Retreat Curved Impeller cw)

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Suspension, Dispersion, Gases, Residual, Heat transfer

Radial/Axial Flow Turbines

DCT (Diffuser Concentration Turbine) K030
DCX (Diffuser Concentration X-shaped)

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Gases, Suspension, Dispersion, Multiphases, Heat transfer

PRT (Pushed Blade Turbine)
PFX (Pushed Blade X-shaped)

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Suspension, Dispersion, Crystallization, Multiphases, Heat transfer

Axial Flow Turbines

TAF (Turbo-Axial Flow)
TFX (Turbo X-shaped)

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Suspension, Crystallization, Heat transfer

TAR (Turbo-Axial Residual) K024

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Suspension, Crystallization, Heat transfer, Residual

Special Turbines

AMT (Abrasion Minimized Turbine) K055

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Suspension, Crystallization, Hydroabrasion, Heat transfer

ANC (Anchor)

Power input
Pumping power
Shear stress
Viscosity range

Processes: High viscosity media, Heat transfer, Residual

SGT (Smith-Gassing Turbine) K004

Power input
Pumping power
Shear stress
Viscosity range

Processes: Homogenization, Dispersion, Heat transfer

PowerBuffs (R018)

- Baffle
- Temperature probe
- Heat Exchanger

Shaft/Hub connection (MultiFlex K073 and CryoTec)

Services around the glass-lined mixing technology

- Product recovery K021
- Maintenance, repair and replacement of the mechanical part K106
- Regulating K060
- Fast shaft K118
- Locality K112 and repair techniques K007
- Process Engineering (Mixing) Technology
- Heat Transfer K164
- Service and service products K166

Spare parts and accessories

- Impeller S004
- MultiFlex Turbines and Shafts S009
- Glass-lined Baffles S013
- Glass-lined Dip pipes S017
- PTE Feed pipes S018
- Cryotic Turbines and Shafts S020



Glass-lined Baffles from THALETEC

Standard Baffles (R020, S013)

- Reverat
- Optional with Temperature probe

QuickTip (R061)
Fast Temperature probe

Premium Baffle (R020, S013)

- Reverat
- Optional with Temperature probe

TS Temperature sensor

DeluxBaffle (R020, S013)

- Delux Baffle light = 15° open angle
- Inner nozzle
- Optional with temperature probe

QuickTip Turbine on Impeller (R114)

MultiTube (R021, S013)

- Reverat
- Optional with Temperature probe

PremiumTube (R021, S013)

- Reverat
- Delux pipe
- Inner nozzle
- Optional with Temperature probe

Selection of multi-stage agitator systems

CRK/DCX **CRK/TAF** **AMT/DCX** **SGT/DCX** **TAF/TFX** **RCIcw/TAF** **CRK** (Cross Arm Turbine) K022

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, Gases, Dispersion, Residual

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, Residual

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, High hydroabrasion resistance

Processes: Multipurpose, Homogenization, Heat transfer, Gases, Dispersion

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, Residual

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, Residual

Processes: Multipurpose, Homogenization, Heat transfer, Suspension, Residual

Figure	Type	η (mPas)	H	R	S	D	C	N	P	W
ANE	> 10000		0	0	-	0	0	++	0	0
AMT	< 10000		++	++	0	0	++	++	0	++
CRK	< 10000		++	++	++	+	+	++	0	++
CRU	< 10000		++	0	+	+	+	++	0	++
DCT, DCX	< 10000		++	0	++	+	+	++	0	++
FRT	< 10000		++	0	++	+	+	++	0	++
PRT, PFX	< 10000		++	0	+	+	+	++	0	++
RCI (Impeller)	< 10000		++	0	0	+	+	++	0	++
RCIcw	< 10000		++	+	+	0	+	++	0	++
SGT, SGT-A	< 10000		0	-	+	+	+	++	0	++
TAF, TFX	< 10000		++	0	0	+	+	++	0	++
TAK	< 10000		++	++	++	0	0	++	0	++
GAT, CRT	> 10000		+	+	0	+	+	++	0	++

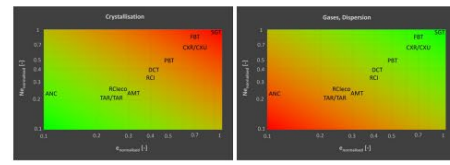
Legend: H: Homogenization, R: Residual, S: Suspension, D: Dispersion (liquid/Residual), C: Dispersion (Residual/Suspension), N: Crystallization, P: Heat Transfer, W: Heat Exchanger

SegTec (R044)

- Surface Gassing
- Dispersion of floating particles
- Debarring

HeatTube (K114)

- Baffle
- Temperature probe
- Dip pipe
- Inner nozzle
- Level measurement
- CF-Connection



We protect your glass-lined reactor - the right technical glass-lining

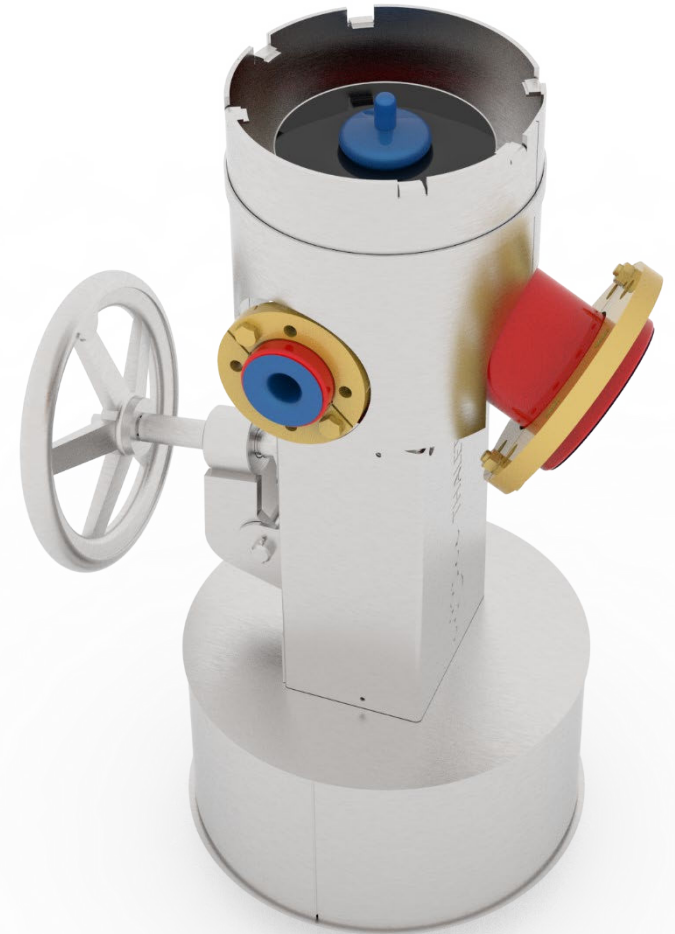
- Chemical resistance homocross curves (R001, R011, R012)
- Select the appropriate glass lining with GridLine (K117)
- VC-Email (Vicat Control) enables visual control of the glass-lining top coat

Types of glass linings

- RAS GLASS blue (R001) (Standard glass lining)
- RAS GLASS white (R011)
- CONDUCTET (R008) (Electrically conductive enamel over the entire layer thickness, glass lining for pharma industry)
- ALBERTIT (R010) (High hydroabrasion resistance)
- ALKAHIT (R101) (Extended resistance on alkaline range)

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- Highest level of safety based on international and current (ISO 10497 and API 607)
- Withstand fire for at least 30 minutes and can be safely opened and closed once
- Combines the advantages of a flat seat valve
- Completely electrically conductive
- Options: temperature probe, tangential CIP-Nozzle, position detection and GMP-Plug





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