



**ENGINEERING
SERVICES**

Reactor solutions

**stainless steel,
nickel & exotic
alloy reactors**



Design Features

cGMP and cGAMP
Up to 30,000 Litre capacity
Inline helical gearbox and flame proof motor
Anchor, propeller or turbine agitating system

Operational Benefits

ASME construction with PED/CE/ATEX options
Energy efficient agitating innovation
Robust easy to clean design (CIP/SIP/WIP)
Operator safe integral barrier isolator options

Our Reactor Technology

S2 design and manufacture a range of stainless steel, nickel and exotic alloy reactors in a variety of materials such as SS316L, SS 316 Ti, SS 904L, Duplex, Titanium and Alloy C22. We also offer high chemical resistant reactors with product wetted parts coated in enamel or StanCoat for improved protection.

S2 has decades of supply experience offering both standardised and customised designs based on the 'CE' mono-block (single piece) and 'AE' two-part dual construction styles. All are supplied to exacting standards and international specifications including ASME, DIN, ANSI, PED, ATEX and CE marking.

Our standard reactors are dimensionally designed to DIN 28136 and offered in a wide range of optional variations including an in-line motor, gearbox driven shaft, heating/cooling jackets and limpets, a range of paddle designs, valves and shaft sealing.



Automatic Reactor Sampling

Probably the highest risk in any reactor process is taking a process media sample at elevated temperatures. Spill over and exposure of sampling liquid is a perennial cause of batch rejection, reprocessing and various quality-related issues ultimately leading to personnel risk and lost profit.



Our innovative reactor sampling systems are designed to provide automatic vacuum-operated safe sampling whereby a pre-established sample quantity is directly pulled into the sampling container in a closed-loop manner. At all times, the operator is in full control, safe and isolated from the product media. Our design is optical sensor powered and is offered with a clear sampling pot so that the operator can see exactly what is happening to the reacted substances at all stages of the reaction process. Furthermore, distributed control system operation is possible and unlike conventional systems, cleaning is easy, fast and risk-free.

Client Value-Adding Benefits

Design Feature

1. cGMP & cGAMP equipment design and construction
2. Manual discharge valve with optional automated design
3. Optional PLC control based automation (cGAMP)
4. Safe automatic reactor sampler option
5. Integrated Barrier Isolator discharge system for solvent recovery system in a controlled operator safe environment

Customer Benefit

- Thorough equipment cleaning; clean/steam/wash in place (CIP/SIP/WIP)
- Gentle, efficient drying - ideal for sensitive powders/products
- Full operational versatility - ideal for multi-product, batch production plants
- Safe operator environment with strict quality control of the reacted product.
- Turnkey solution from single source supplier facilitates the smooth operation of all technologies in synergy which results in improved productivity & efficiency.

S2 Reactor Manufacturing

S2 Reactors are manufactured by a skilled and highly experienced team of coded welders, engineers and quality professionals.

We conduct rigorous inspection regimes starting with receiving the raw material and ensuring full material traceability throughout the manufacturing process.

After fabrication and machining, where applicable, to ensure joint integrity all welds are subjected to Non-Destructive Testing (NDT) in accordance with latest ASME and international pressure vessel standards.

We 100% statically test every pressure vessel / assembly before dispatch and can also perform a dynamic test of the equipment if required.



S2 Reactor Technical Data

- **Design:** ASME Sec.VIII, Division-I, Latest Edition.
- **Construction:** cGMP & cGAMP
- **Main Dimensions:** To DIN 28136. Bespoke designs are made to suit specific client applications
- **Flange Drilling:** ANSI - B 16.6, #150
- **Capacity:** Typically supplied to 30,000 Litres.
- **Operating Pressure:** 0-6 barg (0-90 psig)
- **Operating Temperature:** up to 200 Deg C (390 Deg F)
- **Filtration:** n/a
- **Standard Configuration:** CE & AE* type
- **Motor:** Flange mounted flame proof design (ATEX designs are optional)
- **Material of Construction:** 316L Stainless Steel is the default supply standard. Optional materials include SS 316 Ti, SS 904L, Duplex, Titanium and Alloy C22.

High chemical resistant coatings can be applied on the wetted components of the S2 Reactor. Options include Glass Lining (Enamel) and Stancoat. Please see our website for full details.

* AE type Reactors are typically supplied up to 1,000 Litres capacity only for R&D / lab activities



S2 Reactor Supply Options

S2's Reactor range is designed around a modular concept therefore can be easily customised to suit specific client application requirements. Some of the more standardised supply options are listed below;

Configuration

- Monoblock single piece
- Two part design with removable lid on request

Agitation Design

- Paddle, Turbine or Propeller

Heating / Cooling Vessel Design

- Conventional heating / cooling Jacket.
- Limpet

Instrumentation & Electrics

- Full instrumentation pack for control room operation
- Load cells for in-cycle material weighing before discharge of product
- Variable speed drive electric motor for reduced equipment energy consumption and "ramp-in / gentle" mix startup

Solvent Recovery System

- The S2 Solvent recovery system comprises of a Condenser, at least one Receiver and a vacuum system

Supporting Systems

- Standalone Thermal Control Unit (TCU) to manage and supply the thermal heating and cooling fluid for the heating jacket (where plant services is not available)
- Operator gantry and staircase
- Material loading / Vacuum transfer charging system (Material Handling)
- Standalone Hot Water Washing Systems - CIP, SIP, WIP
- Controlled / automatic discharge system.
- Gas dispersion and hydrogenation system
- Reactor sampling system

Safety & Regulatory Compliance

- ATEX rated (explosion proof) electrics to any standard
- Bespoke guarding systems & laser beam guarding
- Integral Charge / Discharge Barrier Isolator fully enclosing the equipment with operator 1/2 Suit Internal access where required.
- CE and PED compliance (for European shipments)

For bespoke Reactor supply configuration, please contact our technical sales support team.



Above: Single Fluid Heating & Cooling System to accurately manage the temperature of the Reactor heating/cooling jacket.



Left: Limpet heating / cooling design

Below: Barrier Isolator Charging System



Left: Glass lined Reactor supply option

