

PRESSURE and FLOW Reactors

About **AMAR**

Serving Industry Since 1974

New 50000 sqft state-of-the-art manufacturing facility

Largest exporter of pressure & flow reactors in India

Expertise in custom designing high pressure & flow system

Inline with government's MAKE IN INDIA campaign

Exports to over 50 countries worldwide

Over 6000 successful installations worldwide

More than 2000 delighted customers globally

Manufacturing on CNC/VMC & automated machines

Unmatched quality & safety standards

ISO, CE-PED, ASME U, CSA, UL, Ex-Proof, ATEX certification

Prompt & efficient after sales service

Highly skilled & trained team of more than 200 personnel



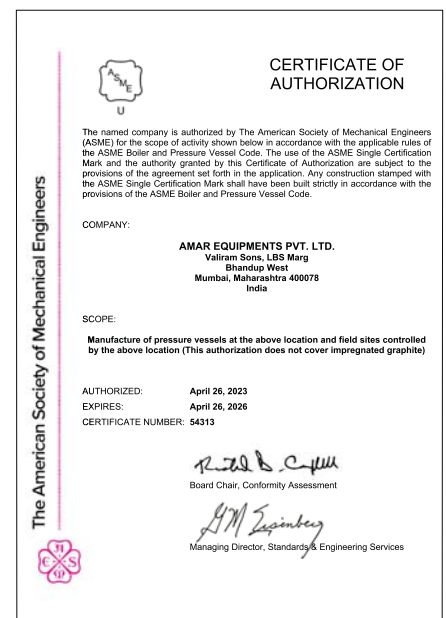
ISO 9001:2015



CE-PED



ASME U



STIRRED PRESSURE AUTOCLAVES



- Volume: 100 ml – 100 ltr.
- Pressures up to 350 bar @ 500°C.
- SS316, Hastelloy, Monel, Inconel, Titanium, Zirconium.
- Zero leakage magnetic coupling.
- Ex-proof, CE / CSA certified electricals, PED / ASME, U stamp certified pressure reactors

PLANT SCALE PRESSURE REACTORS



- Volume: 100 ltr – 10000 ltr.
- Pressures up to 100 bar @ 300°C.
- Material: SS316, Hastelloy, Inconel, Titanium, Zirconium.
- High mass transfer gas induction impeller / PBT impeller.
- Zero leakage magnetic coupling.
- Ex-proof, CE / CSA certified electricals, PED / ASME, U stamp certified pressure reactors.

PARALLEL SYNTHESIZER



- Volume: 100 ml – 2 ltr.
- Pressures up to 350 bar @ 500°C.
- SS316, Hastelloy, Monel, Inconel, Titanium, Zirconium.
- 4 or 6 parallel reactors.
- Fully automated with SCADA software.

ECO CATALYST SCREENING



- Volume: 25 ml x 7 Nos.
- Pressures up to 100 bar @ 200°C.
- For high throughput catalyst screening.
- Bottom stirred parallel reactors..



PRESSURE REACTOR & SYSTEMS

GLASS AUTOCLAVES



- Volume: 100 ml – 2 ltr.
- Design pressure: Up to 10 bar.
- Design temperature: Up to 300°C.
- Material: SS316, Hastelloy, Glass.
- Interchangeable metal & glass autoclaves.

MAGNETIC DRIVE COUPLINGS / STIRRERS



- For reactor volume: 50 ml to 10000 ltr.
- Design pressure: full vacuum to 700 bar
- Material: SS316, Hastelloy C
- For high vacuum distillation in RBF
- Mixer with inline motor & coupling
- High torque coupling up to 1000 Nm

PRESSURE VESSELS



- Volume: 100 ml – 10000 ltr.
- Pressures up to 700 bar & temperature up to 600°C.
- SS316, Hastelloy, Monel, Inconel, Titanium, Zirconium.
- PED / ASME, U stamp certified pressure vessels.

ACID DIGESTION BOMB



- Volume: 50 ml to 750 ml.
- Pressures up to 200 bar @ 250°C.
- Material: SS-316 with PTFE liner & cap.
- Microwaveable acid digestion bombs.

SHAKER HYDROGENATOR



- Volume: 100 ml – 2 ltr.
- Design pressure: Up to 20 bar for metal vessels and 3 bar for glass vessels.
- Design temperature: Up to 200°C for metal vessels and up to 150 °C for glass vessels.
- Material: SS316, Hastelloy C

SUPERCritical FLUID EXTRACTION



- Volume: 100 ml – 1000 ltr.
- Design pressure: Up to 700 bar.
- Feed capacity of 0.24 to 2400 kg/day.
- For extraction of herbs, spices, essential oils, oleoresins, flavours, fragrance, colours.
- Decaffeination of tea & coffee.
- Textile dyeing of fabrics, drying of aerogels.
- Synthesis of nano particles

HPHT CORROSION TESTING



- Volume: 500 ml – 100 ltr.
- Design pressure: Up to 350 bar.
- Design temperature: Up to 600°C.
- Material: SS316, Hastelloy C, Inconel, Titanium
- For static, dynamic, recirculating loop & electrochemical corrosion studies.

GAS HYDRATE FORMATION SYSTEM



- Volume: 100 ml – 100 ltr.
- Pressures up to 350 bar @ 100°C.
- Glass window with camera to observe gas hydrate formation.
- Material: SS-316, Hastelloy, Inconel, Titanium.
- For analysis of effectiveness & efficiency of thermodynamic & kinetic gas hydrate inhibitors.

HIGH PRESSURE CUSTOMIZED SYSTEMS

Amar has expertise to design, manufacture & integrate customised high pressure reactor systems with all accessories, utilities, automation on a common skid for various applications.

100 ltr. Ex-proof hydrogenation pilot plant with catalyst filter & recycle, auto-cooling system, vacuum pump & catch pot.



10 ltr. Fully automated Ex-proof alkoxylation pilot plant



High pressure polytest reactor system



High pressure Ex-proof distillation skid



100 ltr. polymerization reactor for 2 million cP viscous polymer with hydraulic vessel raising, lowering tilting mechanism



Continuous emulsion polymerization pilot plant



AUTOMATED & EX-PROOF PILOT PLANTS

Complete turn-key solutions can be offered for lab to plant scale with desired design, safety & hazardous area certification.



500 ltr. Hydrogenation pilot plant with catalyst filter & recycle



100 ltr reactor with hydraulic lifting arrangement



Ex-proof pilot plant for EO-PO reactions



Multipurpose pressure reactor with column distillation assembly



Fully automated & semi continuous pilot plant for styrene butadiene emulsion polymerization with pneumatic vessel raising, lowering & tilting

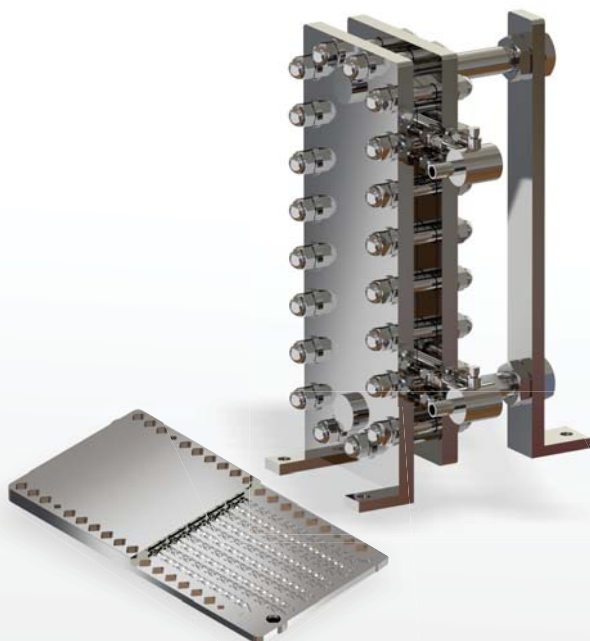


Ex-proof autoclave with load cell arrangement



FLOW REACTOR & SYSTEMS

AMaR-2: METAL MICROREACTOR



- Volume: 1 ml to 2 ltr.
- Flow rate: Up to 720 lph.
- Up to 20 bar & -50°C to 200°C.
- Material: SS316 / Hastelloy C.
- 3D printed microreactors.
- Ideal for fast liquid-liquid reactions with high exothermicity.

AMaR-3: CONICAL 3D FLOW REACTOR



- Volume :1 ml to 2 ltr.
- Flow rate: up to 720 lph.
- Up to 100 bar & -50°C to 350°C.
- Material: SS-316 / Hastelloy C.
- Ideal for fast & exothermic immiscible liquid-liquid and gas-liquid reactions.

AMaR-4P: PINCHED TUBE REACTOR



- Volume: 100 ml – 200 ltr.
- Flow rate: Up to 10,000 lph.
- Up to 50 bar & -50°C to 350°C.
- Material: SS316, Hastelloy C.
- Production scale versatile reactor suitable for various liquid-liquid or gas-liquid exothermic reactions, liquid-liquid extraction.

AUTOMATED FLOW REACTOR



- Reactor volume: 1ml to 100ml
- Flow rate: Upto 100ml/min
- Up to 100 bar & -40°C to 200°C
- Pump & reactor modules: All wetted parts of PTFE, SS316 or Hastelloy
- Optional heating cooling by separate circulator

TUBULAR REACTOR WITH STATIC MIXER



- Volume: 100 ml – 200 ltr.
- Flow rate: up to 10,000 lph.
- Up to 100 bar & -50°C to 350°C.
- Material: SS316, Hastelloy C.
- Optional static mixer elements for better mixing.
- Ideal for pilot to plant scale liquid-liquid, gas liquid & slurry applications.

SLURRY-FLO REACTOR



- Volume: 250 ml to 1 ltr.
- Up to 50 bar & -30°C to 300°C.
- Material: SS316, Hastelloy C.
- Multiple agitated cells connected in series.
- Each cell temperature control and sampling.
- Ideal for lab to pilot scale liquid slurry reactions and slow reactions with high residence times.

CONTINUOUS STIRRED TANK REACTOR



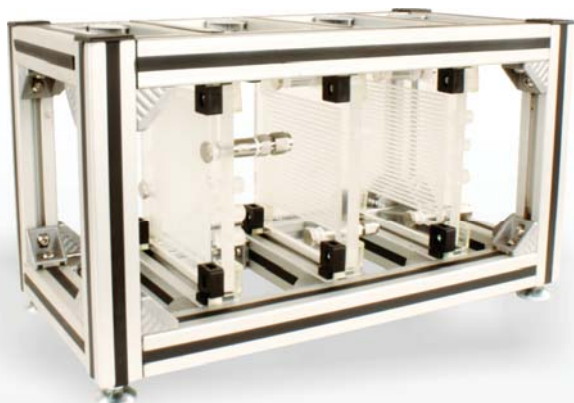
- Volume: 100 ml to 10000 ltr.
- Up to 350 bar @ 500°C.
- SS316, Hastelloy, Monel, Inconel, Titanium, Zirconium.
- Single or multiple reactors connected in series.
- Multiple inlets and outlets for addition & transfer / removal of gases & liquids.

PHOTO-FLO REACTOR



- Volume: 12 ml to 200 ml.
- Flow rate: Up to 150 lph.
- Up to 18 bar & -20°C to 150°C.
- Material: PFA.
- Jacketed PFA coil around light source UV lamp.
- Ideal for applications like photo halogenations, photo alkylation, vitamin D production, etc.

GLASS MICROREACTOR



- Volume: 0.1 ml to 50 ml.
- Up to 15 bar & 300 °C
- Material: Glass, quartz, silicon, glass-silicon compounds.
- Integrated multilayer glass construction for mixing, reaction & heat transfer.

SOLI-FLO REACTOR



- Homogeneous and heterogeneous reactions in same setup using interchangeable tubular attachments.
- Volume 1 ml to 16 ml.
- Up to 350 bar @ 500°C.
- Material: SS316, Hastelloy C.
- Ideal for gas-liquid-solid & vapor phase chemistries.

PACKED BED REACTOR



- Volume : 10 ml to 100 ltr
- Up to 350 bar & 1100°C
- For catalyst screening, oxidation, reforming, hydrogenation, liquefaction, fischer tropsh process, hydro-cracking, trickle bed reactions, vapor phase reactions, catalyst testing, fluid catalytic cracking, etc.

FLUIDIZED BED REACTOR



- Up to 12 bar & 1050°C
- Solid feed: Batch / continuous
- For syngas generation, pyrolysis reactions, biomass / coal gasification reactions, etc.

NANOMAKE



- Flow rates: 100 $\mu\text{L}/\text{min}$ to 50 mL/min
- Temperature: Ambient - 80°C
- Microreactor: Single use & multi use microreactors with different internal volumes
- Nanomaterial synthesis: Lipid, polymer, metal
- Easily replaceable 2ml, 15ml & 50ml sample collection attachments.

LIQUID LIQUID SEPARATOR



- Flow rate: Up to 12 lph.
- Design temperature: Up to 120°C.
- Wetted part: PTFE.
- Advanced membrane-based liquid-liquid separation.
- Highly efficient than gravity based separations, even for challenging emulsions.

HEATING COOLING CIRCULATORS



- Single fluid closed loop system from -90 °C to 250°C.
- Heating cooling bath circulators from -70°C to 175°C.
- High temperature circulators from ambient to 350°C.
- Chillers up to -15°C.
- Suitable for reactor volume from 10 ml to 3000 ltr.

AGITATED NUTSCHE FILTER & DRYER



- 1 ltr – 100 ltr slurry volume.
- Design pressure: -1 to 4 bar.
- Design temperature : - 20°C to 150°C.
- Material: SS316, Hastelloy C.
- 0.005 m² to 0.5 m² filtration area.



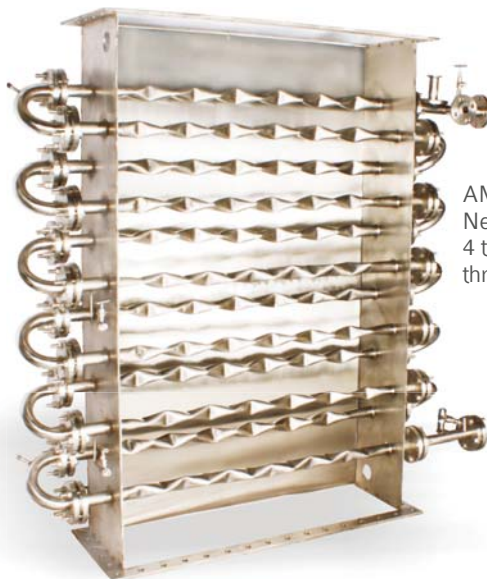
SCALED-UP FLOW REACTOR SYSTEMS

Amar has expertise to design, manufacture & integrate commercial flow reactor systems with pumps, accessories, utilities, automation on a common skid up to 10000 lph. for various applications.

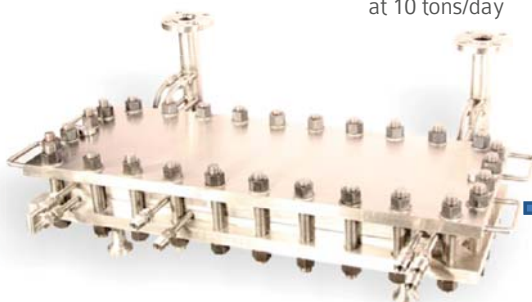
AMAR-4, 10Ltr
N-alkylation with
600 LPH throughput



AMAR-4P, 12 ltr
Neutralization
4 tonnes/day
throughput



AMaR-2 + AMaR-4P
for nitration reaction
at 10 tons/day



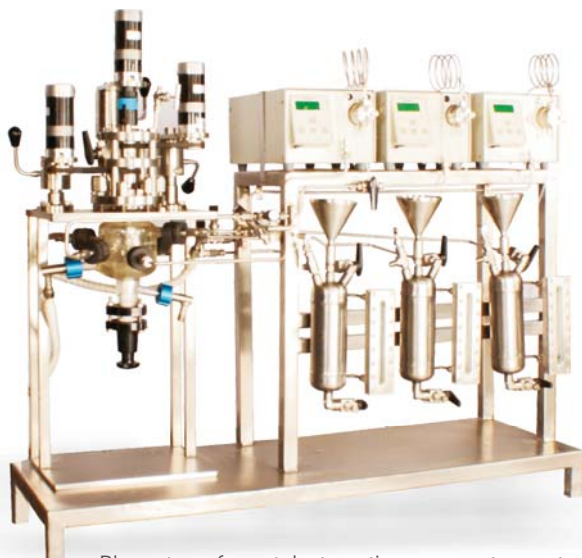
AMAR-4P, 50 ltr.
for decyclization
at 1000 lph

AMAR-4P, 2 ltr
Acetylation at 100 lph



CUSTOMISED FLOW REACTOR SYSTEMS

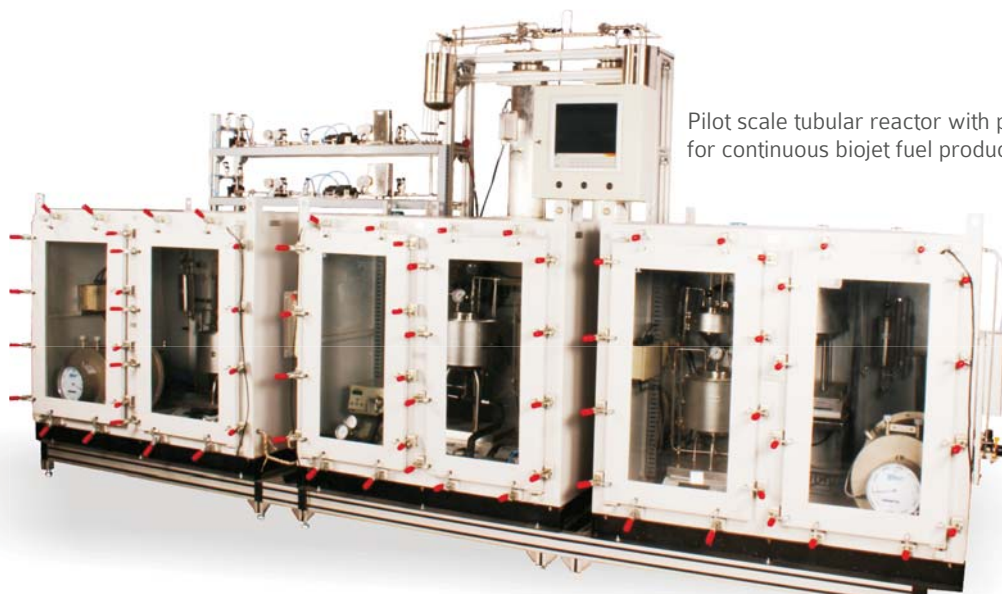
Complete turn-key solutions for lab to plant scale can be offered with desired design, safety & hazardous area certification.



Phase transfer catalyst continuous reactor system with simultaneous 3 different impeller speeds at 3 different levels



High pressure CSTR for hydrogenation



Pilot scale tubular reactor with purge panels for continuous biojet fuel production



Pyrolysis reactor system



CSTR for hydro-cracking of heavy hydrocarbon oils



OUR VALUED CLIENTELE



Aarti Drugs Ltd.



GlaxoSmithKline



Hindustan Unilever Limited



OUR VALUED CLIENTELE



CLIENT TESTIMONIALS

"Product quality is very nice and available within committed time frame, All the Equipment received from Amar is very reliable in performance. Service from Amar is always appreciated. "Excellent service !!!!!!!!!!"

Dr. Dahyabhai Tandel,
Head Development Manager,
Bayer Limited

"We have been dealing with Amar Equipment for long time. Overall, I can say that Amar Equipment is a very Reliable, progressive and Innovative Equipment manufacturer and willing to make extra efforts to develop new design and also fairly economic in comparison to international manufacturers."

Dr. Chinmoy Nandi, V.P.-R&D,
NOCIL LTD

"The quality and performance of the supplied system is excellent and was delivered within the stipulated time frame. We have no hesitation recommending Amar as a quality supplier of high value orders."

Solvay Research and Innovation
Center



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