

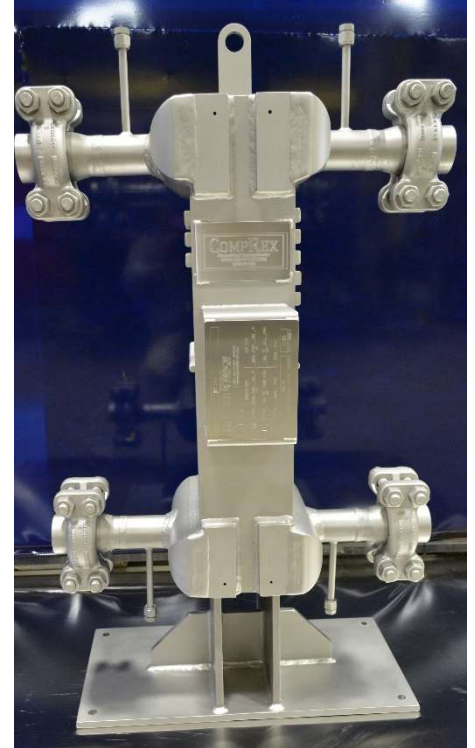
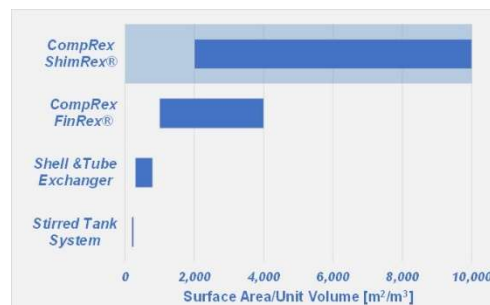
# Diffusion Bonded Exchangers

## ShimRex® - Compact Heat Exchanger and Compact Heat Exchange Reactor

CompRex Compact Heat Exchangers and Compact Heat Exchange Reactors are custom designed for a wide range of chemical process, oil and natural gas processing, industrial gas and power generation applications where efficient heat transfer and compact size are often critical.

ShimRex® is one of CompRex's main product lines of compact heat exchangers and compact heat exchange reactors. It is manufactured using diffusion bonded technology. The alternating layers of heat transfer streams allow for efficient heat transfer. Channel sizes have hydraulic diameters less than 3 mm, so heat travels short distances and the surface area-to-volume ratio of the unit is one of the highest in the industry.

ShimRex units are manufactured by photochemical etching the internal heat transfer surface and structure into sheets of metal that are then stacked in a pattern and diffusion bonded into a single block. CompRex uses a patented technology to provide customized internal heat transfer surfaces that provide the thermal and hydraulic performance required for each particular the application.



### Advantages of ShimRex Exchanger

- Custom design for exact client needs
- Very high temperature and pressure applications
- Internal ligaments for increased mixing and even higher heat transfer
- Tight approach temperatures (less than 2F for some applications)
- Relatively low pressure drop
- Extremely high surface area-to-volume ratio
- Compactness

### Applications of ShimRex Exchanger

- Aerospace industry
- Marine
- Cryogenics
- Power industry
- sCO<sub>2</sub> Brayton Cycle
- Hydrogen production
- Solar industry
- Fuel Cells

### Advantages of ShimRex Reactor

- High temperature/high pressure reactions
- Small catalyst particles packing for high catalyst utilization (up to 5x)
- Intermittent injection within the reactor block
  - No liquid catalyst premixing prior to reactor
  - Intermittent reactant injection for higher selectivity and productivity
- Tight temperature control
  - Highly exothermic or endothermic reactions
  - Sensitive catalyst or product
  - Higher yields of desired products
- Compact design
  - Smaller footprint and auxiliary equipment
  - Lower catalyst requirements

### Applications of ShimRex Reactor

- Gas-to-Liquid processes
- Partial oxidation reactions
- Hydrogenation
- Polymerization
- Petrochemical processes
- Hydrogen production
- Fuel Cells

### Construction Materials

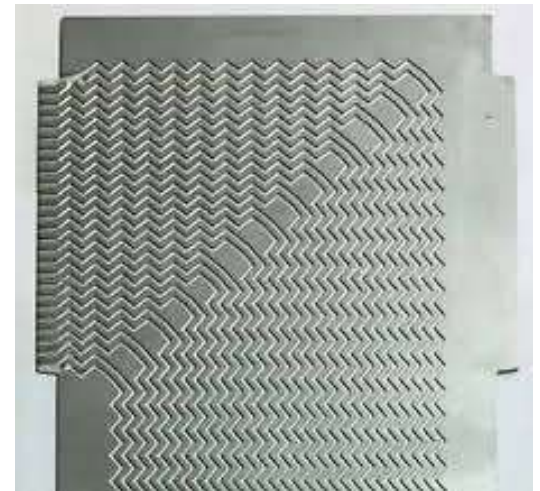
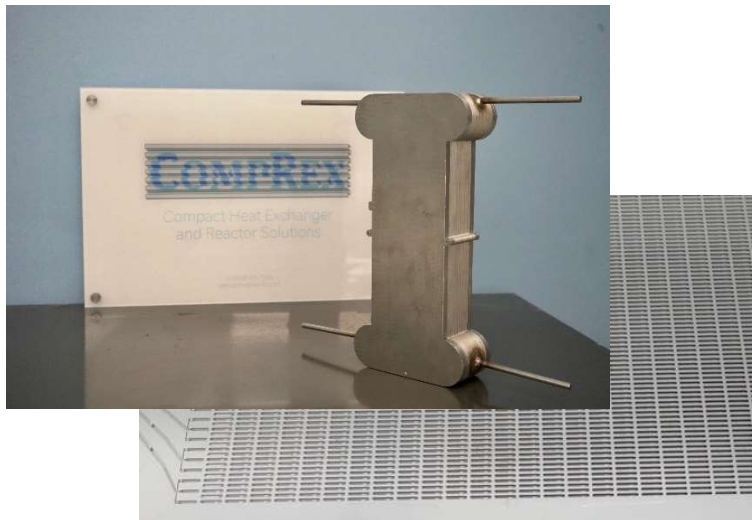
The ShimRex exchangers and reactors can be manufactured out of a variety of metals and alloys. Choice of construction material is dependent on application conditions, such as temperature, pressure and fluid properties. Materials include:

- Stainless Steel
- Titanium
- Aluminum
- Super alloys (for extreme temperature and pressure applications)

### Fabrication Process of ShimRex Exchangers

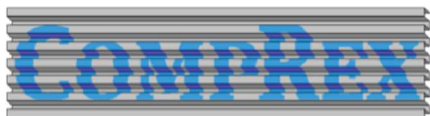
#### Photochemical Etching and Diffusion Bonding

ShimRex products are manufactured by photochemical etching of metal sheets to the desired internal shapes of the unit. The thin sheets are stacked and heated at high temperatures under intense pressures until the metal sheets are bonded into a single block of metal. ShimRex manufacturing process results in units that can withstand severe operating conditions.



### Certifications

CompRex is proud to be ASME certified to manufacture pressure vessels under the U and R stamps.



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