DIEFFENBACHER
MOVE FORWARD. TOGETHER.

Working together for optimal energy recovery

Optimal energy recovery and long service life for high-temperature and high-pressure equipment are becoming increasingly crucial for economic success in the process industry. With us as your reliable partner, you can boost the efficiency and reliability of your production facility. Together, we develop solutions tailored to your requirements to help you maximize energy generation and minimize downtime.

How can we help you improve your energy recovery?

CONTENT

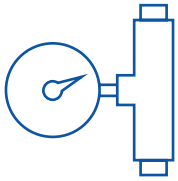
1. WORKING TOGETHER FOR OPTIMAL ENERGY RECOVERY

Take sustainable energy recovery to the next level:

- Globally adaptable solutions through modular design
- High system availability and efficiency
- Customized, customer-focused design and optimal configuration
- Superior support backed by extensive technological expertise
- More sustainable energy generation with advanced technologies to reduce CO_2 emissions

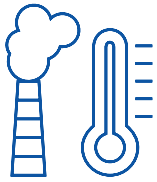
The right energy recovery solution for your plant:

Sizes: 20.000 bis 500.000 Nm³/h
for combination gas flows per process apparatus or heat recovery section



Operating pressures: 10 to 360 bar
depending on the application

Operating temperatures: up to 650°C
for superheated steam, gas mixtures, air, etc.



Operating temperatures on the exhaust gas side: up to 1.500°C

TECHNOLOGICAL EXPERTISE AND A WIDE RANGE OF TECHNICAL SOLUTIONS

To help you maximize energy use across diverse production processes, we provide global support ranging from engineering to manufacturing and operations, with:

- Feasibility studies, consulting and revamp solutions
- Thermal engineering
- Fluid mechanics
- 3D planning
- Calculation, design and detailed fabrication drawings
- Manufacturing through trusted partner facilities
- Comprehensive production supervision
- Testing and quality assurance
- Installation concepts and detailed instructions

Our experts bring decades of experience and a track record of successful projects in power plant systems, process equipment and heat recovery solutions. This experience makes us your ideal partner for any energy project.

TECHNICAL APPLICATIONS

- Horizontal or vertical arrangement for heat recovery sections
- Superheated steam temperature control by means of quench or drum cooler
- Air preheater in plate or tube design
- Refractory lining (concrete, bricks, ceramic fiber)
- Natural circulation for all evaporator systems
- Cylindrical modules with overpressure in flue/process gas
- Piggyback design for fire tube evaporators
- Two-stage water/steam separation in steam drums
- Inbore welding detail for process gas coolers
- Internal bypass control devices


EMAG
25t

2. PROCESS EQUIPMENT

Create synergies in your production process and boost plant efficiency with process equipment and waste heat recovery systems:

- **High-temperature boilers**
  Tailor-made, compact solutions: DIEFFENBACHER high-temperature waste heat boilers are engineered for reliability through comprehensive consideration of chemical and mechanical challenges. Our fire-tube boilers are intelligently integrated with a combustion chamber and custom-designed internal or external bypass systems.

- **High-pressure U-tube heat exchangers**
  Gas-side pressures exceeding 300 bar and water-side pressures over 120 bar require FEM-calculated forged chambers and tube plate details for these heat exchangers. When designing your specialized heat exchanger, we draw on extensive experience from numerous greenfield and revamp projects worldwide.

- **PGBs, PGCs, WHBs & steam drums**
  For safe synthesis gas cooling, we supply fire-tube boiler components with special design and tube-welding details to reduce the high-temperature atmosphere in which these heat exchangers operate.

- **Formaldehyde converter**
  We are your trusted partner. Leverage our long-standing expertise and numerous references for this highly demanding design, including required pre-assembly and partial inspections, as well as detailed manufacturing specifications. During the process, methanol is converted into formaldehyde using the silver catalyst method. Our precisely engineered stainless-steel pressure vessel serves as the converter/reactor.

YOUR KEY ADVANTAGES AT A GLANCE

Optimal energy utilization
through customized, customer-focused desig

High system availability and efficiency
for reduced downtime

Long service life
through optimal engineering

Superior support
backed by comprehensive technological expertise

SUCCESS STORY

PROCESS EQUIPMENT

CUSTOM-MADE SPECIAL PRESSURE VESSELS

Primarily petro-chemical industry
worldwide

Technical Data
Design codes EN12952, EN13445, AD2000, ASME I, ASME VIII Div.1 & S/U stamps /PED
Design pressure: 65bar(g)
Design temperature: up to 380°C
Pressure part materials: Fine-grain steel, austenitic, low-alloyed, CS
Weight of single vessel: up to 175 t

Project Scope:
- Specialized pressure vessels for various chemical and industrial processes, as well as steam storage systems
- For new installations or during the planning phase of modernization projects
- Determining the required load cycles and steam separation quality while preventing intergranular, crevice or pitting corrosion, as well as thermal expansion issues
- Root cause analysis and feasibility assessments for improvements to existing and new systems
- Collaboration with specialized manufacturing partners
- Implementation of complex designs
- Compliance with stringent design codes and sustainability requirements, realized through a wide range of specialized pressure vessel configurations
- Thorough review of customer specifications, identification of concerns and discussion of improved technical solutions

Scope of Supply:
- Design, beginning with heat engineering / root cause analysis (revamps)
- 3D and 2D planning, workshop drawings
- Vessel manufacturing
- Delivery of auxiliaries such as valves and instruments
- Pre-acceptance and shop test with notified body, stamping
- Seaworthy packing and transport to jobsite or FOB North Sea port
- Final documentation with detailed assembly manual

SUCCESS STORY

PROCESS EQUIPMENT

Customized process gas cooler systems according to SMRs or ATRs

Petrochemical industry worldwide

Technical Data

Design codes: ASME I / ASME VIII Div.1 with S/U stamps / PED, EN12953, AD2000
Thermal power / vessel: up to 90 MW
Process gas flow / vessel: up to 480 000 kg/h
Steam production / vessel: up to 165 t/h
Steam pressure: up to 165 t/h
Pressure part materials: Fine-grain steel, low alloyed steels, alloys, CS
Weight of single vessel: up to 150 t

Project Scope:

- Process Gas Coolers (PGCs) and Waste Heat Boilers (WHBs) for hydrogen, methanol, ammonia, and carbon monoxide production plants
- Optimal support for new systems and modernization projects
- Prevention of tube-sheet cracking, metal dusting, hydrogen-induced stress corrosion cracking, thermal expansion issues, hotspots and long-term and low-temperature embrittlement
- Root cause analysis and feasibility studies for revamp improvements based on existing heat recovery system drawings
- Detailed engineering of upgraded modules
- Collaboration with specialized manufacturing partners
- Design and supply of process gas coolers downstream of reformers in various configurations and design code combinations – e.g., piggy-back arrangement, U-tube heat exchangers, dual-pressure systems
- Thorough review of customer specifications, identification of concerns and discussion of improved technical solutions before order placement

Scope of Supply:

- Design, beginning with heat engineering / root cause analysis (revamps)
- 3D and 2D planning, workshop drawings
- Manufacture of coolers with refractory lining, ferrules already installed
- Auxiliaries: bypass regulation devices, steam drums, piping
- Pre-acceptance and shop test with notified body, stamping
- Seaworthy packing and transport to jobsite or FOB North Sea port
- Final documentation with detailed assembly manual


Rated load 100000 kg / 220500 lbs

4. HEAT RECOVERY SYSTEMS

Harness the energy generated in your production process and reuse it elsewhere – for example, to produce (superheated) steam or to preheat process gases, feedwater and combustion air:

- **Heat recovery systems**
  The majority of the reformer's waste heat is used to generate steam, superheat it and preheat gas mixtures, air and condensate. These media are then fed back into the steam reforming process, creating a closed energy loop.

- **Economizer & superheater modules**
  In sulfuric acid production, the heat from process gas in various stages of the contact furnace (the so-called "beds") is used to heat water or superheat steam. Since the process gas is under pressure, the required heat exchanger casings are often designed as cylindrical shells.

- **Revamp modules**
  At the end of a system's lifecycle or during planned upgrades, individual modules of a waste heat recovery system are often replaced. Precise fit, compliance with the latest codes and standards, fulfillment of desired improvements, and short delivery times are key to success.

- **Heat recovery boilers**
  Combustion of waste gases or residual liquids in the chemical industry takes place at high temperatures under strictly controlled conditions. The quality requirements for waste heat boilers are therefore exceptionally high and can only be met by considering all worst-case scenarios during the design phase.

YOUR KEY ADVANTAGES AT A GLANCE

Optimal energy utilization
thanks to customized, customer-focused design

High system availability and efficiency,
resulting in reduced downtime

Extended service life
through optimized engineering

Comprehensive support
backed by in-depth technological expertise

SUCCESS STORY

HEAT RECOVERY MODULES

Custom-made heat recovery modules, following the steam reformer

Petrochemical industry worldwide

Technical Data

Design codes ASME I / ASME VIII Div.1 & S/U stamps / PED, EN12952
Thermal power of WHRS: up to 170MW
Flue gas flow: up to 660.000kg/h
Steam flow: up to 570t/h
Steam pressure: up to 175 t
Pressure part materials: 347, 321, 304, P91, low alloyed, alloy 800H, CS
Weight of single modules: up to 125 t

Project Scope:

- Waste heat modules for your hydrogen, methanol, ammonia, and carbon monoxide production plants
- Optimal support for new systems or revamp planning
- Prevention of unwanted bypass flows, thermal expansion issues, hotspots, vibration damage, relaxation cracking, and long-term embrittlement
- For revamps: root cause analysis and feasibility studies based on drawings of the existing heat recovery system
- Detailed engineering of improved modules
- Collaboration with specialized manufacturing partners
- Waste heat modules for heat recovery systems (WHRS) downstream of reformers in various configurations and design code combinations
- Thorough review of customer specifications, identification of concerns, and discussion of improved technical solutions before order placement

Scope of Supply:

- Design beginning with heat engineering / root cause analysis (revamps)
- 3D and 2D planning, workshop drawings
- Manufacturing of module(s) with refractory lining already installed
- Auxiliaries: expansion joints, piping, quench cooler, etc.
- Pre-acceptance and shop test with notified body, stamping
- Seaworthy packing and transport to jobsite or FOB North Sea port
- Final documentation with detailed assembly manual

SUCCESS STORY

HEAT RECOVERY MODULES

Custom-made process boiler systems following furnaces and converters

Industrial sector and petrochemical industry
worldwide

Technical Data

Design codes EN12952, EN12953, EN13445, AD2000, ASME I / ASME VIII Div.1 & S/U stamps / PED
Thermal power of system: up to 120 MW
Process gas flow: up to 350 000 kg/h
Steam flow: up to 180 t/h
Steam pressure: up to 90 bar (g)
Pressure part materials: Fine-grain steels, austenitic, low alloyed, cast iron, CS
Weight of single vessels: up to 175 t

Project Scope:

- Process waste heat boilers for your sulfuric acid production plants, sulfur recovery units, and thermal oxidation systems for chemical residues
- Prevention of sulfuric acid corrosion, sulfidation, chlorine-induced high-temperature corrosion, thermal expansion issues, hotspots, and low-temperature embrittlement
- Avoidance of unplanned shutdowns through customized, customer-focused design and optimized system configuration
- Root cause analysis and feasibility studies for improvements based on drawings of the existing process boiler system
- Collaboration with specialized manufacturing partners
- Process boiler systems in various configurations and design code combinations, for example, fire-tube or water-tube boilers, cylindrical or rectangular modules with superheaters and economizers
- Thorough review of customer specifications, identification of concerns, and discussion of improved technical solutions before order placement

Scope of Supply:

- Design beginning with heat engineering / root cause analysis (revamps)
- 3D and 2D planning, workshop drawings
- Manufacturing of boiler with refractory lining, ceramic ferrules
- Manufacturing of steam drum, economizer, superheater modules, piping
- Pre-acceptance and shop test with notified body, stamping
- Seaworthy packing and transport to jobsite or FOB North Sea port
- Final documentation with detailed assembly manual

6. LIFECYCLE MANAGEMENT & SERVICE

PARTNERSHIP-BASED LIFETIME SERVICE FOR MAXIMUM AVAILABILITY

To ensure maximum availability of your heat recovery system and process equipment, our highly qualified service team provides comprehensive lifecycle support using a true partnership approach. Our full range of technical services applies to both our own systems and third-party installations:

Consulting
- Mass and energy balances
- Thermal engineering calculations
- Process check
- Flow analyses
- Preliminary planning of revamp projects
- Advice on upcoming inspections and plant shutdowns

Basic support
- Recording and assessing the plant status
- Development of an extended maintenance strategy
- Development of improvement options

Spare and wear parts management
- Ensuring the availability of spare parts
- Plant-specific spare and wear parts

Revamp and modernization
- Replacement or adaptation of existing systems to changed framework conditions
- Design and supply of improved components

Optimization
- Projects for operational and plant optimization

Repair
- Root cause analysis and rectification
- Root cause analysis reports
- Restoring functionality

Maintenance and inspection work
- Checking the system for operational safety and functionality
- Systematic identification of potential faults
- Replacement with original spare parts

Remote service
- Advice on application and operating problems
- Fault diagnosis and situation analysis via telephone

Discover how we can help you reach next-level energy efficiency

DIEFFENBACHER Energy GmbH, based in Bludenz, develops, designs and sells energy plants. As part of the DIEFFENBACHER Group, we offer advanced, energy-efficient and resource-saving solutions. In the energy-transition era, we also contribute to lower emissions and reduced energy costs.

DIEFFENBACHER is an international group of companies specializing in mechanical and plant engineering. With 1,850 employees and 19 production and sales locations worldwide, we are a leading manufacturer of press systems and complete production plants for the wood-based materials, automotive, aviation and recycling industries. We design and build power plants and heat recovery systems for sustainable energy generation. As an independent family business in its fifth generation, we have stood for reliable partnership and continuous progress for over 150 years.

Your contact person
How can we help you move forward? Contact us.

Sebastian Völker
Chief Sales Officer
sebastian.voelker@dieffenbacher.com
+43 5552 6135 572

DIEFFENBACHER ENERGY GmbH
Herrengasse 23
6700 Bludenz
Austria

www.dieffenbacher.com/de/energy