

# Products & Services

- Power Generation
- Oil and Gas
- Desalination and Water Treatment

MAPNA GROUP



## Introduction

MAPNA Boiler and Equipment Manufacturing and Engineering Company (MAPNA Boiler in brief), having a brilliant history of more two decades in supplying industrial products and participating in the execution of country's big projects, is an industrial knowledge-based company. The company is a subsidiary of MAPNA Group which runs on the path to value creation for clients, shareholders, and other beneficiaries through the design, supply, manufacturing, installation, erection, and commissioning, finance, after sales service, technical consultation, and project management of different boilers being utilized in power plants, oil, gas, and mining industries, fixed equipment for oil, gas, and petrochemical plants, and water treatment and water desalination units as well in domestic and foreign markets.

Relying on the competent human resource, modern manufacturing facilities, and new technologies acquired from renowned companies in the field and developed over years on, this company moves toward the achievement of sustainable development objectives in the country's power, oil, and gas industries.

Aligned with the country's development plans, MAPNA Boiler company over the course of the past few years has entered into the water and wastewater industries and been strengthening its place in the production of potable water, and the treatment of industrial and municipal water and wastewater through the development of its associated products.

This company takes part as EPC and EPCF contractor in the execution of power, refinery and petrochemical, and water treatment and water desalination plants. More than 1000 experts are now working in the company distributed into the departments of design and product development, research & technology, sales and business development arranged in the central building in Tehran office and the departments of manufacturing, engineering, production, quality control, project execution, procurement, etc. in Haljerd and Elahieh complex and some employees are stationed in the sites of our projects.

Haljerd complex of MAPNA Boiler Company, locates in 12th. km Karaj-Qazvin road in 76,000 square meter area with a -35000square-meter closed workshop, is equipped with various required machineries including cutting, pressing, bending, rolling, welding, and light&heavy duty lathe machines and heat treatment furnace and test and examination equipment as well. Some like the heavy duty rolling machine and pipe induction bending machine and heat treatment furnace are unique across the country and even in the Middle East in terms of tonnage and the level of technology. With the purpose of storing other materials and equipment able to be kept in open and sheltered spaces, Elahieh complex occupies an area of 210,000 square meters containing workshops allocating 15000 square meters to finning, forming, and continuous pipe bending machines to support automatic bending and finning of tubes and pipes in HRSGs harps and automatic bending of water walls in industrial and steam thermal power plant water tube boilers.

All machineries and equipment gathered in these two factories give MAPNA Boiler Company the ability of its products construction, test, and assembly in a complete and independent way, though it has gained an appropriate opportunity of accredited vendors to enhance its production agility. In addition, according to the successful experience in installation, erection, and commissioning, the company has attempted to present comprehensive solutions for the satisfaction of customers' needs earning competitive advantages.

MAPNA Boiler and Equipment Manufacturing and Engineering Company has managed to obtain ISO 9001, ISO 14001, ISO 18001, ISO 27001, and ISO 50001 certifications, and ISO 17025 Laboratory Accreditation. The company has kept trying an organized application of the contained approaches by implementing and developing technology management (TM), knowledge management (KM), and project management (PM) in accordance with PMBOK. It also received the National Award Silver Prize for Organizational Excellence and Performance.



# Products and Services

## CURRENT PRODUCTS

- Heat Recovery Steam Generators (HRSGs) in different industries
- Bi-drum Industrial / Package Water Tube Boilers
- Steam Thermal Power Plant Water Tube Boilers
- Cogeneration or Combined Heat and Power (CHP) Steam Generators
- Stand-Alone (Fresh Air Firing) HRSGs
- Coal-Firing Boilers
- Deaerators
- Shell & Tube Heat Exchangers
- Pressure Vessels
- Stationary and Containerized Seawater and Brackish Water Reverse Osmosis (SWRO & BWRO) Membrane Desalination Units
- Water Treatment Systems
- Industrial and Municipal Wastewater Treatment Systems
- Medical and Industrial Containerized Oxygen Generators
- De-oiling Units
- Tanks, Vessels, Distillation Towers, Reactors
- Water Treatment Plants



## SERVICES

- Products Aftersales Services and Supports
- Laboratory Services
- Operators Training
- Project Management Services



## NEW PRODUCTS:

- Boilers Flue Gas Desulfurization (FGD)
- Once-Through HRSGs
- Municipal Solid Waste Incinerators
- Sulfur Recovery Units



# Heat Recovery Steam Generators

Heat Recovery Steam Generators (HRSG) are widely used in different industries such as combined cycle power plants, oil, gas, and petrochemical plants, mining industries, steel, copper, and aluminum production plants, etc. MAPNA Boiler Company is capable to design, supply, manufacture, install, erect, and commission, and offer consulting and aftersales services for various types of HRSGs based on new technologies in the world. The company's HRSG products with peerless abilities in the country can be installed and erected downstream of E-, F-, and H-class or larger Gas Turbines and feature Horizontal- and Vertical-type configurations, single, double and triple pressure, with and without Reheat, and Supplementary Firing equipment. All components of the boilers, especially pressure parts, are built at MAPNA Boiler's factories using modern machineries and test equipment in compliance with the world's latest edition of applicable standards such as ASME. Aiming at fulfilling new power generation market needs, the company signed a Technology Transfer and License agreement in 2016 with John Cockerill, formerly Cockerill Maintenance & Ingénierie (CMI), in Belgium large HRSGs downstream of F- and H-series Gas Turbines are thereby granted as Licensed Products.

In case of gas turbine outage due to maintenance, our HRSGs can take the advantage of Fresh Air Firing system, consisting of air fan and burner in general, when the steam generators can keep producing steam independent of GT so-called Stand-Alone operation. MAPNA Boiler Company is able to equip HRSGs with this system making the design and manufacturing of all the components required together in order to meet projects' demands.



Furthermore, MAPNA Boiler's HRAG products can be operated in power plants burning gas and gas oil fuels in gas turbines. The application of combined heat and power (CHP) generation (Cogeneration) in addition to combined cycle power plants is the house for the company's HRSGs. The way it takes a part of the steam produced is utilized for seawater desalination in Multi-Effect Distillation (MED) units or for process consumptions in petrochemical plants. Qeshm's Water and Power Project is an actual sample of a CHP application for the production of potable water the company involved in.





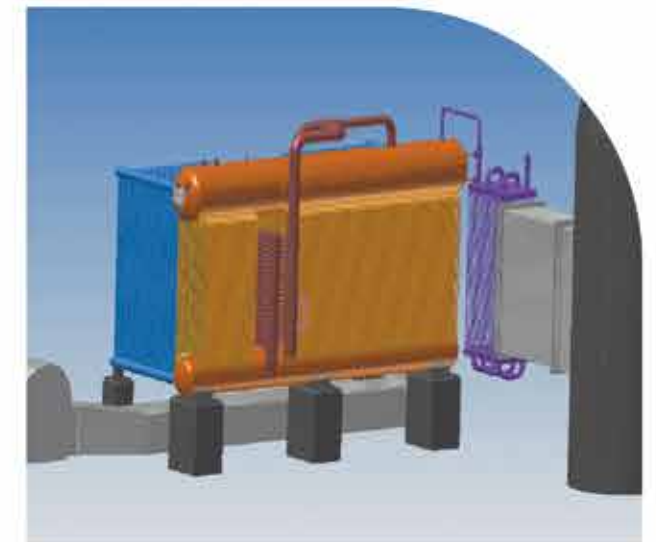


# Water-Tube Industrial/Package Boilers

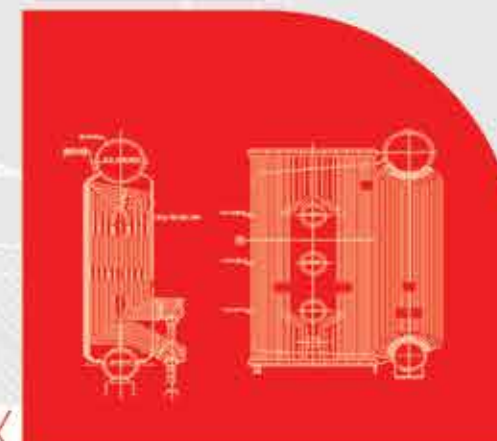
Industrial water tube boilers are used in power plants, petrochemical plants, refineries, and food and mining industries in order to produce process steam. MAPNA Boiler Company has supplied for instance water tube boilers in South Pars Unit -121 gas phases ,13 ,16 ,15 20 ,14 and 21, Fajr, Mobin, and Damavand petrochemical plants. For small-scale boilers, there are capabilities in the company to assemble the products in the workshops and transport them to operation sites packaged.

The water tube boiler products can accommodate the following features:

- Steam capacity up to 250 ton/hr
- Steam outlet pressure up to 115 bar
- Steam outlet temperature up to 525 °C



Using update and proper design and engineering softwares, MAPNA Boiler's industrial/package water tube boiler products are being optimized in weight and dimension and are capable to satisfy clients' demands with the highest efficiency and performance.





# Stema Thermal Power Plant Water Tube Boilers

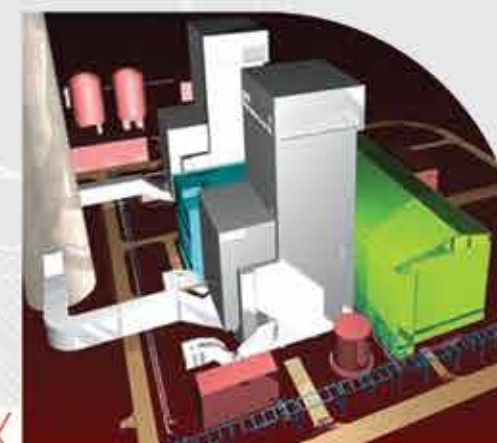
MAPNA Boiler and Equipment Manufacturing and Engineering Company is the first and only Iranian company in the design and manufacturing of subcritical natural circulation steam thermal power plant water tube boilers producing up to 1100 ton/hr superheated steam to rotate -325MWe steam turbines.

The conditions of the steam supplied by the boiler products to the HP and IP sections of the steam turbines are:

Superheater Steam Pressure	174 bar
Superheater Steam Temperature	540 °C
Superheater Steam Flow Rate	1100 ton/hr
Reheater Steam Pressure	38 bar
Reheater Steam Temperature	540 °C
Reheater Steam Flow Rate	880 ton/hr



To meet environmental regulations, the company can supply the system of Flue Gas Desulfurization (FGD) to reduce SOx compounds pollution.





# Deaerator

MAPNA Boiler Company has the capability of designing, supplying, manufacturing, installing, erecting, and commissioning of various horizontal and vertical deaerators up to 1400 ton/hr in capacity. The Deaerator products are of Spray-Tray type being used to prevent corrosion in water side by the removal of dissolved gases, especially O<sub>2</sub> and CO<sub>2</sub> from boiler feedwater.



The enhancement of thermal efficiency is the other benefit of using it. The deaerators can bring down the oxygen content of the boiler feedwater to 7ppb. ASME, ASTM, and HEI are standards according to which these products are being designed and constructed in the company.



# Shell & Tube Heat Exchangers

Shell and tube heat exchangers span a vast range of applications in the downstream and upstream industries of oil, gas, petrochemical and power plants and food industries. Resting on experts' knowledge as well as modern manufacturing tools and machines, MAPNA Boiler Company is ready to present services in the field of design, construction and maintenance (re-tubing) of such heat exchangers.

With utilization of heavy duty rolling machines, this company is capable to produce the heat exchanger of the shell with the thickness of up to 300 mm varied in size and range of materials including Carbon Steel, Stainless Steel, and High Alloy Steel compliant with TEMA and ASME standards.



In refineries, Re-boilers are used as a type of shell and tube heat exchangers to reheat the condensate products at the bottom of distillation columns and return them vaporized to the distillation columns. Re-boilers are also designed and manufactured by MAPNA Boiler.





# Pressure Vessels, Storage Tanks, Distillation Columns, Reactors, and Hads

MAPNA Boiler Company have been involved in the design and construction of various types of steel and alloy pressure vessels up to 300 mm thick used in different industries like oil, gas, and petrochemical.

In power plants the company's similar products such as high pressure (HP), Intermediate pressure (IP), and Low Pressure (LP) drums, blowdown tanks, and flash tanks are in large numbers and various, too, being designed and manufactured according to ASME, BS, and API standards.



Atmospheric storage tanks for storing crude oil and refinery products such as gas oil and fuel oil in both types of the spherical and cylindrical and double wall are supplied by MAPNA Boiler based on API 650.





# Desalination & Water Treatment Systems

In line with MAPNA Group's objectives MAPNA Boiler Company has taken on its activities for the design, supply, and construction of different water desalination and water treatment plants in industries leading to products which can be mentioned as:

- Condensate Polishing Plants (CPPs) and Water Treatment Plants in Gas, Oil, and Petrochemical Industries and Power Plants
- Electro De-Ionization (EDI) Systems
- Membrane Desalination Units of Seawater and other Water Resources using Reverse Osmosis (RO) Method



- Water Pretreatment Systems including Ultrafiltration (UF), Media Filters, Precipitation and Sedimentation, Active Carbon Filters
- Seawater Pretreatment Dissolved Air Flotation (DAF)
- Industrial Wastewater Treatment Plant
- Zero Liquid Discharge (ZLD) Systems





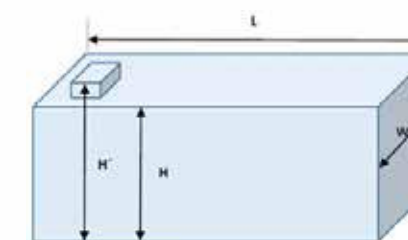
# Containerized Oxygen Generators

The method of oxygen generation in this equipment is the separation of oxygen from the compressed air which is considered as one the newest technology worldwide for the oxygen production. In case there is gas of high purity on demand, medical, industrial, or other purposes, the packages of oxygen and nitrogen using Pressure Swing Adsorption (PSA) method are applied.

## Advantages of PSA Method:

- Cost-effective and Highly Practically Efficient
- Low Operating Expenses
- Easy-to-Use
- High Safety Factor
- Precise Purity
- Low Pressure Drop
- Long Lifetime
- Suitable Size and Low Weight
- Mobile (Containerized)

Capacity	600NL/min
Oxygen Purity	Min %3± %93
Filtration	Water Trap + Filters + Dryer + Antibacterial
Generation Method	Pressure Swing Adsorption (PSA)
Compressor Capacity	11.2m/min
Adsorber	Zeolite 13X HP
Electrical	3phase - 125A
Total Weight	14000 kg
External Dimension	30ft × 9.5ft (10.8ft) × 7.8ft [6.1m × 2.9m (3.3m) × 2.4m]



L x H(H') x w      30 ft x 9.50 ft (10.8 ft) x 7.8 ft  
L x H(H') x w      6.1 m x 2.9 m (3.3 m) x 2.4 m



# Containerized Water Treatment and Desalination Systems

In order to cut down design time duration and accelerate products delivery to customers, a varied number of water treatment and desalination packages with a wide range of capacities and applications have been made available to offer by MAPNA Boiler and Equipment Manufacturing and Engineering Company.

One of characteristics these packages have in common is the installation of equipment and skids inside a container. The containerization reduces installation and commissioning time besides the ease of transportation. Moreover, it lifts the need to construct silo or building for equipment installation.

A suitable array of disinfection, pretreatment, main treatment, cleaning, final treatment (Demineralized), and other systems will be proposed to clients depending on the kind, quality, and flow rate of inflow and demanded water.

Various pretreatment units are available designed earlier which consists of pressurized sand filter, Ultrafilters (UFs), self-cleaning screen filters, disk filters. In all the water package products, Reverse Osmosis (RO) plays the part of water desalting and the process of demineralized water production is on Electro Deionization system (EDI). All systems are supported by electric and control panels and there is the possibility of remote monitoring using GPRS technology if requested by a client. The optimization and flexibility to fit variety of inlet water conditions and client's needs have been attempted together for the design of the water package products. Auxiliary equipment like diesel generator (DG) for power generation will be available at client's request.

Operability in:

- Supply of Potable Water in Critical Situations for Small Cities
- Supply of Water at the time of Increased Seasonal Consumption Demand
- Supply of Process Water during the Commissioning of Industrial Units
- Supply of Industrial Water in times of Quality Change in Raw Water
- Supply of Emergency Water for Industrial Units in Production Outages
- Supply of Makeup Water in times of Quality Change in Potable Water or Industrial Water



Entire Classification:

- Production units of treated water from brackish water, seawater, and treated wastewater for industrial use up to 400 m3/day in one container and up to 2000 m3/day in two containers
- Production units of demineralized water from brackish water, seawater, and treated wastewater up to 12 m3/hr in one container and up to 40 m3/hr in three containers
- Production units of potable water from brackish water and seawater up to 400 m3/day in one container and up to 2000 m3/day in two containers





## Product Support and Aftersales Services

MAPNA Boiler and Equipment Manufacturing and Engineering Company presents clients an abundant number of aftersales services containing supervision of installation, erection, and commissioning, periodic and regular inspections, performance tests, spare parts delivery, regular maintenance and overhaul, upgrading and renovating, and supporting technical and engineering consultations in the field of such as water chemistry.

More than decades' active history running through the grounds of design and execution of power plants steam cycle, this company has provided extensive services for the cycle chemistry as:

- Study of chemical regimes having been applied to boilers and present of improving instructions in need
- Investigation of failures and corrosion history in boilers looking into data analysis and boiler performance conditions
- Sampling from different points of water/steam cycle to make more accurate estimation of the existing conditions
- Analysis of failed components in MAPNA Boiler's well-equipped quality control laboratory
- Root Cause Analysis (RCA) and reporting results
- Investigation of chemical injection/dosing systems performance and sampling to make certain of their accuracy
- Presenting maintenance instructions for replacement of failed components
- Supervision on thickness measurement of areas subject to failure and data analysis to emerge assured of desired condition
- Presenting operational instructions to avoid the reappearance of failures and providing of execution supervision
- Risk-Based Inspection (RBI)
- Fitness-For-Service (FFS) Assessment
- Consideration of chemical cleaning necessity and presenting associated instructions
- Data analysis of performance after improvements to be certain about the effectiveness of applied instructions
- Maintenance, renovation, and procurement of spare parts for existing systems
- Failure diagnosis and feasibility analysis for upgrading power plants water treatment systems including CPPs and WTPs
- Study, analysis, diagnosis, and improvement of power plant water and steam cycles
- Establishing workshops and training programs for operators



Additionally, as per clients' needs, MAPNA Boiler Company arranges trainings for operators along with educational materials and documents to be provided and qualified trainers to be dispatched to clients' operational sites. Depending upon priceless experience obtained as a result of performance test data collected from over hundred boiler units, teams of technical and engineering experienced specialists in the company are able to diagnose and find roots of failures in case performance problems appear in a boiler and offer suitable solutions to eliminate the defects or prevent the occurrence of similar events.

In clients' interest leading to long-term maintenance contracts, MAPNA Boiler has the capacity to provide services for technical consultations, preventive maintenance programs, supervision of boilers operation and control, periodic inspections, and procurement of components and equipment and guarantee a permanent and constant operation of its boiler products.



## Laboratory Test Services

The laboratory of MAPNA Boiler Company is a strategic business unit which has been established with the mission of providing high-quality laboratory services. Intended to offer laboratory test services to power plants, oil, gas, petrochemical, and other related industries, this lab benefits from expert human resources as well as advanced equipment and apparatuses and succeeded to receive ISO 17025 certification from National Accreditation Center of Iran (NACI) in 2013 after passing required standards.

- Services to be Offered to Different Industries:
- Tensile and Proof Load Test
- Compression Test
- Shear Test
- Bending Test
- Impact Test
- Hardness Test (Rockwell, Brinell, Vickers)
- Break, Nick Break, and Fracture Tests
- Flattening Tests
- Flare Test and Flange Test on Tube and Pipe Specimens
- Spring Constant Test
- Chemical Composition Test
- Quantometer Test for Iron-base and Copper-base Alloys
- Portable X-Ray Fluorescence (XRF) Analysis for Stainless Steel and Non-Ferrous Alloys
- Weld Metal Chemical Composition Test
- Non-Destructive Chemical Analysis



- Metallographic and Microscopic Examination
- Weld Tests
- PQR tests based on API 1104, ISO 15614, AWS D1.6, AWS D1.1, and ASME SEC IX
- Non-Destructive Tests (NDTs) including VT, PT, UT, MT, RT, Phase Array
- Surface Roughness Test
- Heat Treatment on Laboratory Specimens
- Special Examinations
- Stack Exit Gas Analysis
- Sulfuric Acid Dew Point Determination for Controlling Corrosion
- Portable Thermograph
- Portable Flowmeter







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