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- IMPREGNATION UNITS
- INDUSTRIAL AUTOCLAVES



## WE PRODUCE:

- Industrial electric furnaces
- Pyrolysis furnaces
- Vacuum pressure impregnation (VPI) units
- Autoclaves for various industry segments
- Hardening baths
- Test stations (benches) for DC and AC electric motors
- Automated systems for cladding of bodies of rotation
- Equipment for repair shops
- Rotor and stator winding sections of DC and AC electric machines

# INDUSTRY SOLUTIONS

Volna develops and manufactures customized process equipment for all industries

## AREAS OF USE:



Aviation industry



Automotive industry



Shipbuilding industry



Railway industry



Machinery industry



Construction industry



Energy industry



Defense industry complex

## OPTIMAL TECHNOLOGY

For impregnating products with various impregnation compositions, changing properties and shapes of materials under the influence of vacuum, pressure, temperature Volna manufactures impregnation units and autoclaves for heat treatments

## AREAS OF USE:

### Impregnation units:

- Vacuum pressurized impregnators (VPI)
- Vacuum
- Rotary
- Drip-jets

### Autoclaves:

- Autoclaves for composites
- Autoclaves for vacuum drying
- Autoclaves for vulcanization of rubber
- Autoclaves for wood drying
- Autoclaves for triplex glass



# VACUUM-PRESSURIZED IMPREGNATION UNITS (VPI)

## Main components:

- Autoclave
- Impregnation agent storage tank with heating, mixing, degassing unit
- Compressor, vacuum station
- Vacuum and compressed air lines, heating/cooling circuit and compound transfer lines
- Impregnation filtration system
- Heating system
- Cooling system
- Ventilation system
- Control system



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## Functionality:

- Quick-acting bayonet shutter
- Vacuum and air line
- Sensors for continuous monitoring of pressure, temperature, viscosity, impregnation level
- Heating system, cooling system
- Degassing unit
- Programmed blocking of autoclave lid opening in the presence of pressure, vacuum.
- Manual or automatic loading conveyor system
- Automated control and dispatching system of autoclave (ACS) - + Remote control and reporting on technological process

## Specifications:

Diameter	300...3000 mm and above if necessary
Length	300...13 000 mm and above if necessary
Operating pressure	Up to 15 bar and higher if necessary
Operating temperature	200 °C and higher if necessary
Operating temperature	Non-stainless structural steel, etc.

# AUTOCLAVES FOR POLYMERIZATION OF COMPOSITES

Autoclaves by Volna are designed for heat treatment (autoclave molding) of composite materials in various working solutions in accordance with the technical specifications of the customer for various technological processes



## FUNCTIONALITY:

- Quick-acting bayonet shutter
- Adjustable heating speed
- Adjustable cooling speed
- Minimal temperature gradient throughout the interior space
- Pass-through bushings with connected  $t^{\circ}$  sensors --> Monitoring and control of  $t^{\circ}$  at any location
- Modern thermal insulation materials --> Reduction of heat losses and autoclave dimensions
- Vacuum line with high-temperature vacuum hoses
- System for pressurizing the autoclave with air or inert gases
- Fans for forced convection Minimal temperature gradient throughout the interior space
- Manual or automatic loading conveyor system
- Automated control and dispatching system of autoclave (ACS) --> Remote control and reporting on technological process

## Specifications:

Diameter	300...3000 mm and above if necessary
Length	300...13 000 mm and above if necessary
Operating pressure	Up to 15 bar and higher if necessary
Heating and cooling gradients	2,5 $^{\circ}\text{C}$ and higher if necessary
Heating and cooling speed	2,5 $^{\circ}\text{C}/\text{min}$ and lower if necessary



# AUTOCLAVES FOR TRIPLEX PRODUCTION

Autoclaves make it possible to produce laminated glass (triplex) of various sizes, based on customers' technical requirements

## ADVANTAGES OF USING AUTOCLAVES FOR THE PRODUCTION OF TRIPLEX:

Maximum glass transparency

High impact and shear strength

The glass is resistant to significant temperature fluctuations

Increased resistance to humidity

Simultaneous lamination of different product properties

## FUNCTIONALITY

- Quick-acting bayonet shutter
- Adjustable heating speed
- Adjustable cooling speed
- Minimal temperature gradient throughout the interior space
- Modern thermal insulation materials --> Reduction of heat losses and autoclave dimensions
- Manual or automatic loading conveyor system
- Fans for forced convection --> Minimal temperature gradient throughout the interior space

## Specifications:

Diameter	300...3000 mm and above if necessary
Length	300...13 000 mm and above if necessary
Operating temperature	Up to 15 bar and higher if necessary
Operating pressure	250 °C and higher if necessary
Heating and cooling gradients	2,5 °C/min and lower if necessary
Heating and cooling speed	Up to 10 °C and higher if necessary



# AUTOCLAVES FOR VULCANIZATION OF RUBBER

Autoclaves are designed for vulcanization in steam, water or air media of rubber, rubber-fabric and other products.

# AUTOCLAVES FOR IMPREGNATION

Autoclaves are designed to achieve perfect vacuum impregnation - for the treatment of wood, marble, etc. Impregnation allows products to achieve maximum strength and insulation over a long period of time

## Specifications:

Diameter	300...3000 mm and above if necessary
Length	300...13 000 mm and above if necessary
Operating pressure	Up to 15 bar and higher if necessary
Operating temperature	250 °C and higher if necessary



# VACUUM IMPREGNATION UNITS FOR CASTINGS

Impregnation of castings is performed to seal micropores, shrinkage sinks and microcracks in metal castings, synthetic materials, ceramics, composites and electroplated parts. It allows to increase the ability of products to withstand high pressures (up to 150 kg/cm and more) tenfold

## IMPREGNATION PROCESS

Impregnation of castings using the dry/moist vacuum method

Removal of excess compound

Washing castings with water

Polymerization of the product in a hot environment

## FUNCTIONALITY:

- Autoclave with centrifugation system
- Cold rinse module, warm rinse module
- Polymerization module + 98 °C
- Lifting equipment for moving parts between operations
- Baskets, cassettes for placing and rotating products
- Vacuum and pressurization system
- Automated control system



## RANGE OF SERVICES:

Technical consulting

Chief installation, adjustment and start-up of equipment

Diagnostics and maintenance

Modernization

Delivery

Supply of spare parts, parts and assemblies



## SAFETY:

Impregnation plants and autoclaves produced by Volna comply with the technical regulations of the Customs Union, including TR TS 032/2013 "On safety of overpressure equipment". The equipment has the appropriate EAC marking.

## DOCUMENTS:

- Certificate of own production
- Safety rationale
- TR TS 032/2013, 004/2011, 010/2011, 020/2011
- License for design of pressure vessels