SUMMARY OF THE YEAR 2019

PBUCH SA Newsletter January / February 2020

New trends

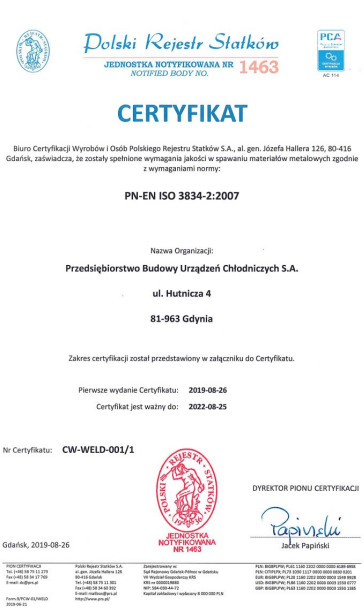
It was a year of hard work on various projects, because we delivered equipment and performed works on the Navy vessels "Albatros" and "Mewa" as well as on Multi-Purpose Vessels for the Szczecin Maritime Office; we built reactors for the chemical industry and heat-exchangers for fertilizer plants. We produced steam boilers for the furniture industry, condensers and chiller units for ship refrigeration installations, and also made repairs of pressure equipment in compliance with the PED standard.

However, at the same time, we worked busily on expanding approvals and preparation our company for changing standards, market needs and environmental protection requirements.

We have started work on the research project entitled " Development of an innovative, ecological refrigeration equipment for ship applications "as part of the" INNOSHIP "Sectoral Operational Program.

We invite you to familiarize yourself with our summary of projects executed in 2019 and technologies implemented last year.

Emilia Węglewska, Trade and Marketing Department Manager



Polski Rejestr Statków
JEDNOSTKA NOTYFIKOWANA NR 1463
NOTIFIED BODY NO.

CERTYFIKAT

Biuro Certyfikacji Wyrobów i Osób Polskiego Rejestru Statków S.A., al. gen. Józefa Hallera 126, 80-416 Gdańsk, zaświadcza, że zostały spełnione wymagania jakości w spawaniu materiałów metalowych zgodnie z wymaganiami normy:

PN-EN ISO 3834-2:2007

Nazwa Organizacji:
Przedsiębiorstwo Budowy Urządzeń Chłodniczych S.A.
ul. Hutnicza 4
81-963 Gdynia

Zakres certyfikacji został przedstawiony w załączniku do Certyfikatu.

Pierwsze wydanie Certyfikatu: 2019-08-26
Certyfikat jest ważny do: 2022-08-25

Nr Certyfikatu: CW-WELD-001/1

Gdańsk, 2019-08-26

DYREKTOR PIONU CERTYFIKACJI
Jacek Papiński

New welding technologies introduced

In 2019, new welding technologies were approved in our production plant: for stainless steel material group 8.1 — method 141/136 and 136 and for carbon steel, material group 1.2 — method 135/136. Approval was made by the Classification Body: Bureau Veritas.

Welding of a steam boiler

Certificates for PBUCH obtained in 2019

Approval of the production plant in accordance with the following standards:

- EN ISO 3834-2:2007
- ISO 9001:2015 (upgrading)
- EN 1090-1:2012

AISI 316 vacuum cyclones

Filter columns

Vacuum cyclones to Lithuania

We have completed the production of process equipment for industrial installations, for the production line of urea-formaldehyde resins (UF) - a type of plastics from the aminoplast group. UF resins are formed as a result of the condensation reaction of urea with formaldehyde in an acidic environment.

Process parameters

The tanks are intended for a mixture (steam and UF resin) flowing in an amount of 2.4 t per hour at 70°C and pressure 0 bar and work as cyclones. As a result of the steam expansion process, the condensate flows down through the bottom collector and the heated medium is directed to the next stage of production.

Technical specification

The tanks were made of AISI 316L stainless steel.

Tank diameter - 1400mm, height - 2610mm

Welding in accordance with approved WPS instructions, with a B quality level according to EN ISO 5817.

Certification — In accordance with the Pressure Equipment Directive 2014/68 / EU (PED), CE mark.

Filter columns for water treatment plants

We produced a series of pressure vessels for the water filtration process. The tanks are filled with DT0 activated carbon.

The specificity of the use of columns required protecting the internal surfaces of tanks with a special, two-component epoxy paint approved for contact with drinking water. After protection, a coating is resistant to water, beer, fruit juices, fats and edible oils. In addition, it is also resistant to methylisobutylketone, xylene, citric acid, diluted and concentrated alkali solutions and demineralized water.

Filter columns

Fundusze Europejskie Inteligentny Rozwój

Rzeczpospolita Polska

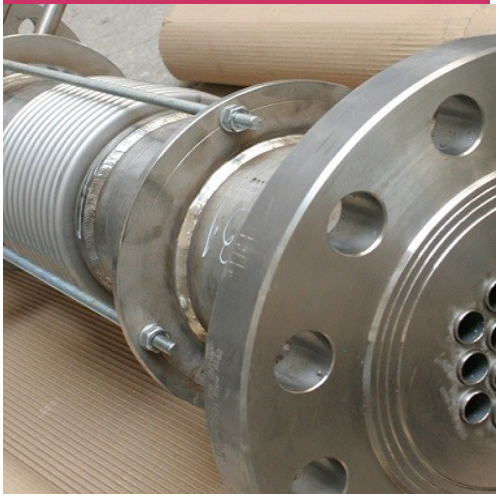
Narodowe Centrum Badań i Rozwoju

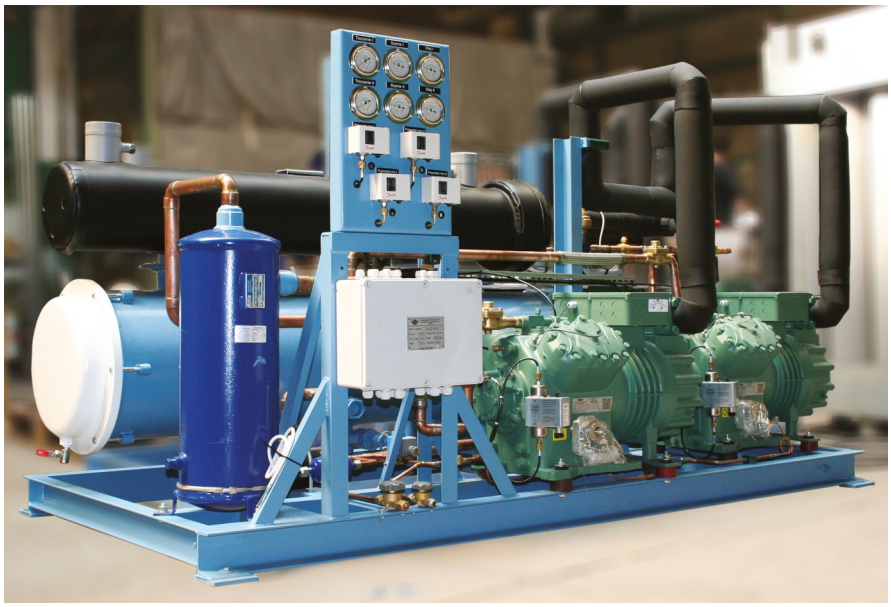
Unia Europejska Europejski Fundusz Rozwoju Regionalnego

Titanium welding

Titanium, in preheated and liquid state, has strong affinity towards atmospheric gases (oxygen, nitrogen, hydrogen), which causes fragility of that material, and lowers some of its properties, such as plasticity, susceptibility to creeping, or resistance to stress corrosion cracking. In order to avoid these occurrences, we use protection of welding zone with such gases as, for example, argon or helium, or their mixtures and using special welding fluxes that don't contain oxygen. Alternatively, welding is carried out in vacuum. It has also been observed that increase of additive elements to titanium usually negatively affects its weldability.

Conditions which must be met during welding: in a welding room, the temperature should not be higher than 15°C. Most frequently, welding of titanium and its alloys is performed by using the TIG method.





R&D Project

We have started work on the research project entitled "Development of an innovative, ecological refrigeration equipment for ship applications" as part of the "INNOSHIP" Sectoral Operational Program.

Our motto is the words of Mr. Kitack Lim IMO Chairman:

"Ambitious regulatory targets will act as the catalyst for technology, triggering research, development and innovation. Now is the time to start developing the vessels, the fuels, the delivery mechanisms and all the other necessary infrastructure to support zero-emission shipping."

The result of work on the project will be a series of refrigeration units and chillers adapted to work in marine conditions, working on the R744 and other refrigerants with a GWP factor (Global Warming Potential) below 150 with an ODP factor (Ozone Depletion Potential) equal to 0.

At the same time, we are preparing a station adapted for welding works of shell and tube heat exchangers with tubes and tube plate made of titanium.

Regarding type approval certification, we are in contact with Classification Bodies: PRS, DNV, LRS and ABS.

Conceptual work will soon be confirmed by the series of tests in a specially adapted test room.

Regarding titanium welding technology, we are at the stage of preparation for approval and adaptation of the welding station to the requirements of the specifics of the construction of shell and tube heat exchangers and the regime of special atmosphere in which this welding must take place.

Steam boiler

Technical parameters

The maximum operating temperature of the boiler: 204°C

Water capacity: 11900l

Nominal steam output 3.5 t / h

Test pressure: 26 bar

Heat exchange surface: 125m^2

Steam boiler

Next steam boiler with flue gas reversing chambers was made for the order of Nowy Styl Group.
The boiler was produced for the purposes of modernization of client's boiler room at the Nowy Styl Group Wood Industry Plant on the south of Poland. It was built as a flame-tube, three-draft boiler, horizontal, adapted to work with a fixed grate and a chute. Fully welded construction.

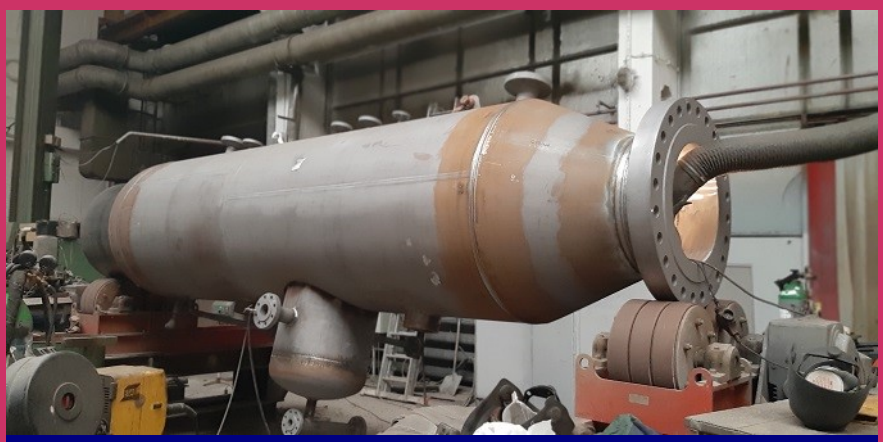
Acceptance requirements

Boiler meets the requirements of the PN EN 12593 standard, harmonized with the Directive 2014/68/UE and has been manufactured under the supervision of UDT. The delivery also included boiler approved documentation.

Steam boiler during production

Three phase separator

For the modernization of one of the PGNiG installations, an crude oil, reservoir fluid, reservoir water and natural gas heat - exchanger is now under construction.
The allowable pressure in the heat - exchanger is 100 bar.



Three phase separator

Special requirements

Due to work in an environment containing H_2S, separator have to meet the requirements of the NACE MR0175 standard, which is associated with the use of special materials, welding technologies and special laboratory tests.

Certification by IACS Classification Bodies

PBUCH provides calculations, drawing documentation and carry out the procedure for the approval of pressure equipment in the following marine Classification Bodies:

ABS

American Bureau of Shipping

BV

Bureau Veritas

CCS

China Classification Society

DNV / GL

Det Norske Veritas / Germanisher Lloyd

KR

Korean Register

LRS

Lloyd's Register

Class NK

Nippon Kaiji Kyokai

PRS

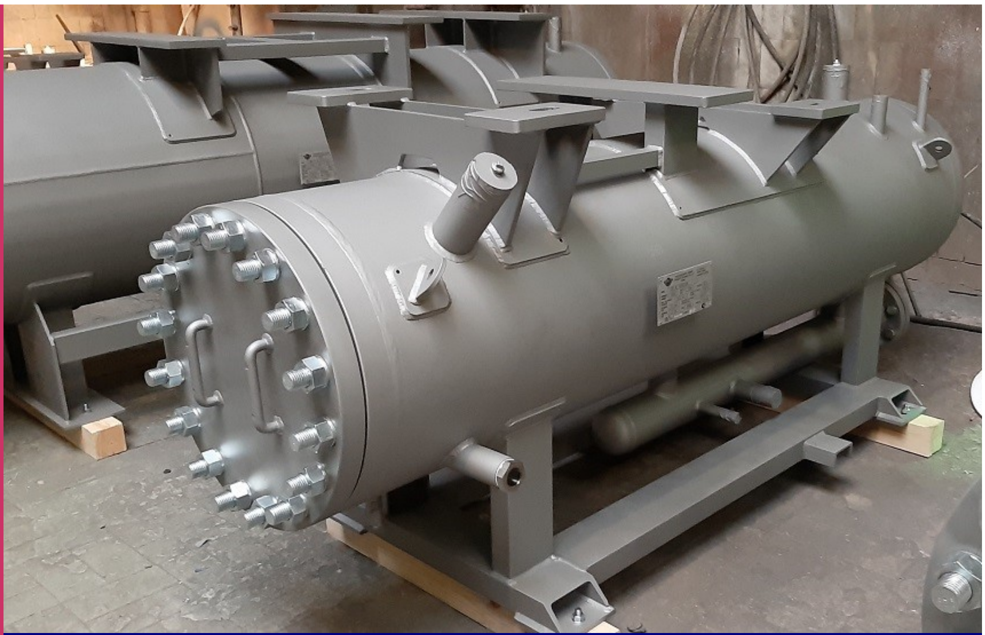
Polish Register of Shipping

RINA

Registro Italiano Navale

RMRS

Russian Maritime Register of Shipping



NH_3 / CO_2 cascade separators

Design, certification and production of high pressure equipment

PBUCH SA is an experienced manufacturer of pressure equipment for the industry: refrigeration equipment and shell and tube heat exchangers, liquid separators, pressure tanks.

Changing conditions and requirements for industrial refrigeration installations require the use of components for pressures from 20 to 150 bar.
We have got appropriate approvals and experience in the preparation of concession documentation, its approval and acceptance by the Third Bodies: UDT, PRS, TÜV and WDT.

DNV·GL

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No: **AMT000003T**

This is to certify:

That the Manufacturer
Przedsiebiorstwo Budowy Urzadzen Chlodniczych S.A.
Gdynia, Poland

is approved for the
Manufacture of Welded Pressure Vessels, Class I & II

The approval is granted on condition that
DNV GL rules for classification – Ships

are complied with in all respect

Manufacturer(s) approved by this certificate is/are accepted to deliver according to DNV GL, DNV and GL rules.

This Certificate is valid until **2020-12-31**.
Issued at **Høvik** on **2016-12-21**

DNV GL local station: **Gdansk**

Approval Engineer: **Zeinab Sharifi**

for **DNV GL**

Digitally Signed By: Marveng, Marianne Spæren
Location: DNV GL Høvik, Norway
Signing Date: 22.12.2016

Marianne Spæren Marveng
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in production facilities and methods may render this Certificate invalid.

Form code: AM 1461a Revision: 2015-06 www.dnvgl.com Page 1 of 2
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Certyfikat

Certyfikat Zgodności UE
zgodnie z dyrektywą 2014/68/UE

Numer certyfikatu	**DP/201/84935809/101**
Nazwa i adres wytwórcy	**Przedsiębiorstwo Budowy Urządzeń Chłodniczych S.A.** **ul. Hutnicza 4, Gdynia 81-963** POLSKA Na podstawie wyników badań/testów, producent jest uprawniony do oznaczenia produkowanych urządzeń ciśnieniowych w zakresie modułu G ze znakiem CE 2627
Ocena zgodnie z Dyrektywą 2014/68/UE	**Moduł G - Zgodność w oparciu o weryfikację jednostkową**
Numer raportu	84935809.01.01
Opis urządzenia ciśnieniowego	Skraplacz SRs 125
Nr seryjny	58745
Zakład produkcyjny	**Przedsiębiorstwo Budowy Urządzeń Chłodniczych S.A.** **ul. Hutnicza 4, Gdynia 81-963** POLSKA

Zaświadcza się, że wyniki przeprowadzonych badań niżej wymienionego urządzenia ciśnieniowego spełniają wymagania a urządzenie spełnia odnoszące się do niego wymagania, określone w Dyrektywie 2014/68/UE implementowanej do prawa polskiego Rozporządzeniem Ministra Rozwoju z dnia 11.07.2016r. (Dz. U. 2016 poz. 1036).

Zabrze, dnia 13.07.2018

TÜV Rheinland Polska 2627 Notified Body

Wojciech Szałek

TÜV Rheinland Polska Sp. z o.o.
Jednostka Notyfikowana ID-Nr. 2627
Dział Usług dla Przemysłu/ Sekcja Certyfikacji i Spawalnictwa
ul. Komitetu Obrony Robotników 56, 02-146 Warszawa
Oddział: ul. Wolności 327, 41-800 Zabrze
tel.: (32) 271 64 89 / fax: (32) 271 64 88

www.tuv.com

PCA Polskie Centrum Akredytacji Certyfikacja Wyrobów AC 141

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Tanks for MBR systems

Welded constructions according to EN1090

In 2019, PBUCH obtained a certificate of conformity of the factory production control for the production of welded steel structures and auxiliary components in EXC 2 class in accordance with the EN 1090-1: 2009 + A1: 2011 standard (PN-EN 1090-1: 2012).

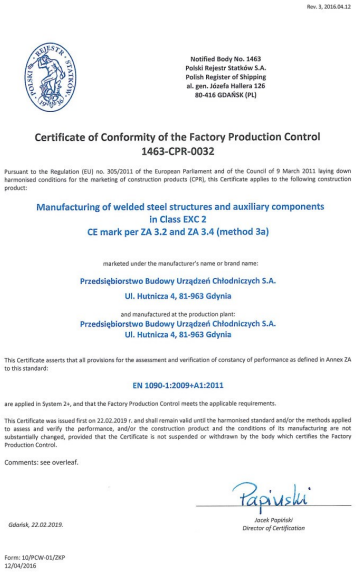
The certificate applies to steel and aluminium constructions for both newly produced and renovated plants.

Tanks for MBR systems

PBUCH produced tank and pump modules for the Membrane BioReactor system.

MBR technology is based on biodegradation and membrane separation and allows the treatment of contaminated water to meet the most stringent standards.

The process ensures the highest water quality without the need to add or generate chemicals that are hazardous to the environment or ship operation.



Rev. 3, 2016.04.12

Notified Body No. 1463
Polski Rejestr Statków S.A.
Polish Register of Shipping
al. gen. Józefa Hallera 126
80-416 GDAŃSK (PL)

Certificate of Conformity of the Factory Production Control
1463-CPR-0032

Pursuant to the Regulation (EU) no. 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products (CPR), this Certificate applies to the following construction product:

Manufacturing of welded steel structures and auxiliary components in Class EXC 2
CE mark per ZA 3.2 and ZA 3.4 (method 3a)

marketed under the manufacturer's name or brand name:

Przedsiębiorstwo Budowy Urządzeń Chłodniczych S.A.
Ul. Hutnicza 4, 81-963 Gdynia

and manufactured at the production plant:

Przedsiębiorstwo Budowy Urządzeń Chłodniczych S.A.
Ul. Hutnicza 4, 81-963 Gdynia

This Certificate asserts that all provisions for the assessment and verification of constancy of performance as defined in Annex ZA to this standard:

EN 1090-1:2009+A1:2011

are applied in System 2+, and that the Factory Production Control meets the applicable requirements.

This Certificate was issued first on 22.02.2019 r. and shall remain valid until the harmonised standard and/or the methods applied to assess and verify the performance, and/or the construction product and the conditions of its manufacturing are not substantially changed, provided that the Certificate is not suspended or withdrawn by the body which certifies the Factory Production Control.

Comments: see overleaf.

Gdańsk, 22.02.2019.

Jacek Papiński
Director of Certification

Form: 1D/PCW-01/ZKP
12/04/2016

Air receivers

We produced another series of tanks for the system of suppressing pressure pulsations in the pulp transporting pipelines.

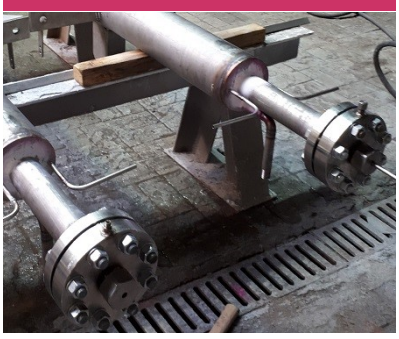
Attenuator tank

Chemical reactors

As part of the laboratory equipment of the Institute of Industrial Chemistry in Warsaw on behalf of Prochem S.A. we made the following devices:

- Decarboxylation reactor
- Hydrogenation reactor
- Isometrization reactor
- Adiabatic reactor
- Raw material tank
- Coolers

The reactors were designed to work under pressure of 40 bar for such media as oils, hydrogen, carbon monoxide or carbon dioxide in the tank and molten salts in the outer jacket. The reactors have been designed to operate at temperatures up to 550°C.



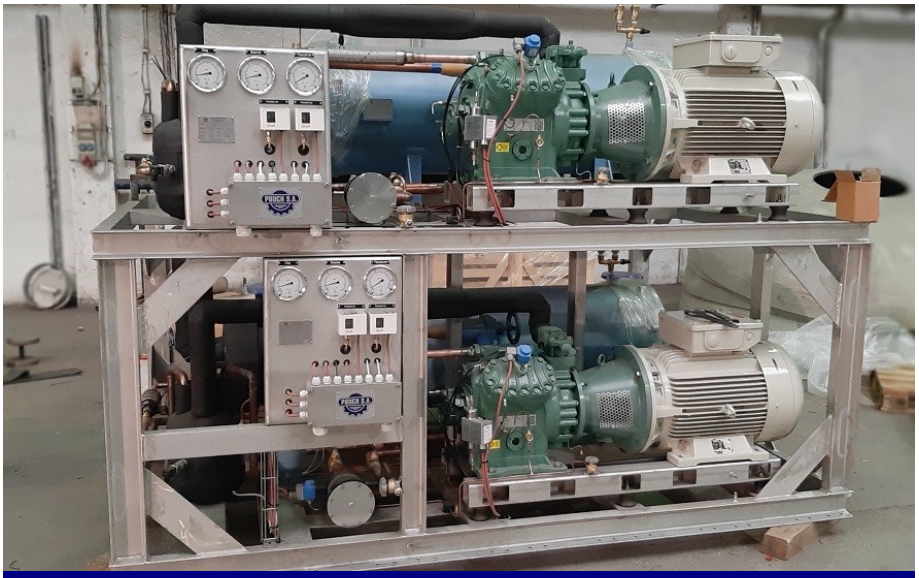
Insulated pressure tank for fire extinguishing system with a volume 33900l

Tanks for liquid CO_2

Last year, we accepted and partly completed an order for our Danish customer to produce nine (9pce) of CO_2 tanks with a capacity of about $34m^3$ with the approval of the RINA Classification Body.

For 2020, we contracted production of pressure tanks with a capacities of $24.9m^3$ and $47.1m^3$ with DNV certificate, $28.5m^3$ with CCS certificate and $7.4m^3$ with CE mark.

CO_2 tanks are produced in various configurations depending on the system requirements, with an evaporator in the form of an internal coil.



Agregat wody lodowej

184 kW Chillers

Cooling capacity: 2 x 92 kW

Material: stainless steel and amagnetic materials

Refrigerant: R404a

Chilled water flow: 13.55 m^3 / h

Chilled water temperature: + 12°C / + 6°C

Power supply: 3x440V / 60Hz

PRS certification for pressure components

Equipment for "Minehunters"

In October 2019, was held the launch ceremony of the ORP Albatros ship - the second of a series of modern Minehunters. Minehunters will be delivered to the 13th Minesweeper Squadron that is part of the 8th Coastal Defense Flotilla.

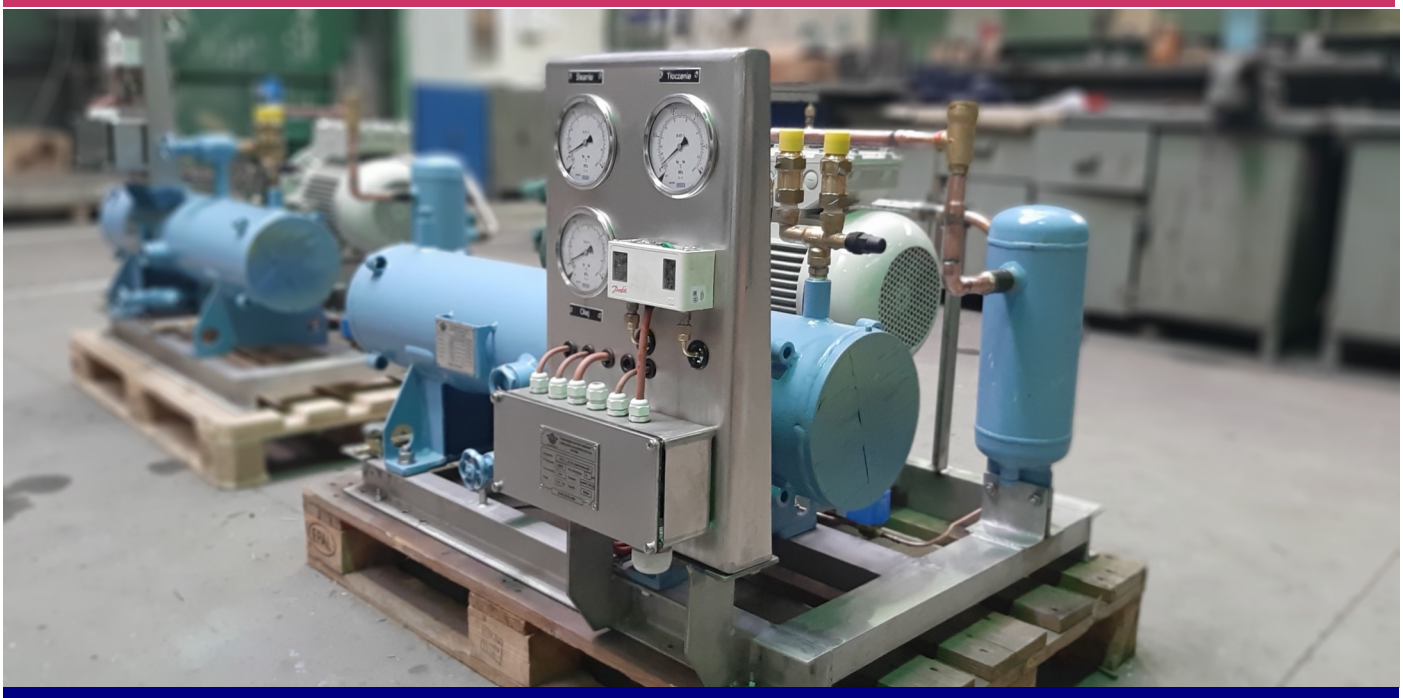
It is the most modern unit of this class in the NATO alliance.

Also in October, the construction of the third ORP Mewa vessel began.

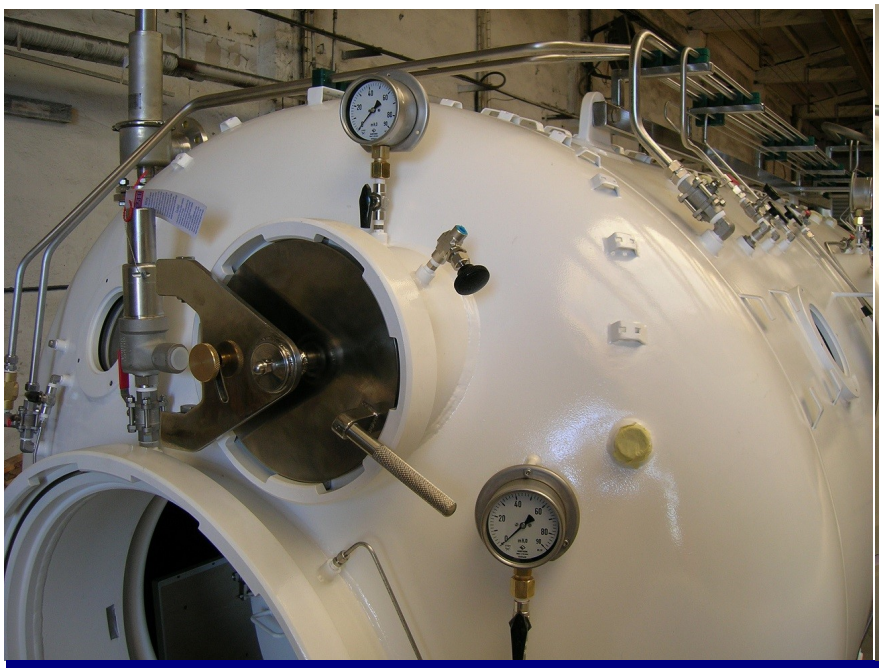
PBUCH SA provides ventilation and air conditioning, refrigeration, fresh water preparation and hyperbaric chambers to both ships.

HVAC system

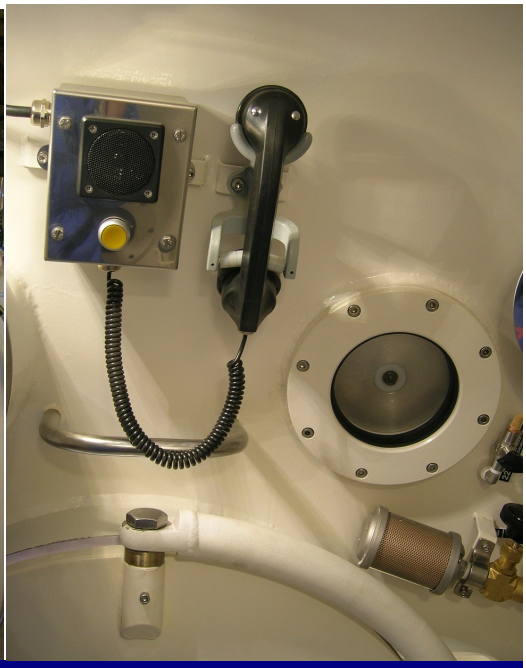
The specificity of the ship requires the use of amagnetic materials, hence the entire air conditioning and refrigeration installation as well as the water treatment unit as well as the hyperbaric chamber unit are made of stainless steel.



Condensing units for provision cooling plant made of amagentic materials



Transport lock



Hyperbaric phone

Ship's Hyperbaric Chambers

Foto Gallery

Display screen

Control panel

Distillation column evaporator

Reconstruction of the distillation column evaporator

The evaporator was produced to replace an existing exchanger.

In the inter-pipe space, water vapour flows at a pressure of 17 bar, temperature of 205°C, and heats the working medium (EDT) from -29°C to 150°C.

The heat exchange surface in this system is: 338m^2.

Capacity of inter-pipe space: 1920l capacity of working space: 2380l.

The exchanger has been designed for continuous operation for 7,000 hours.

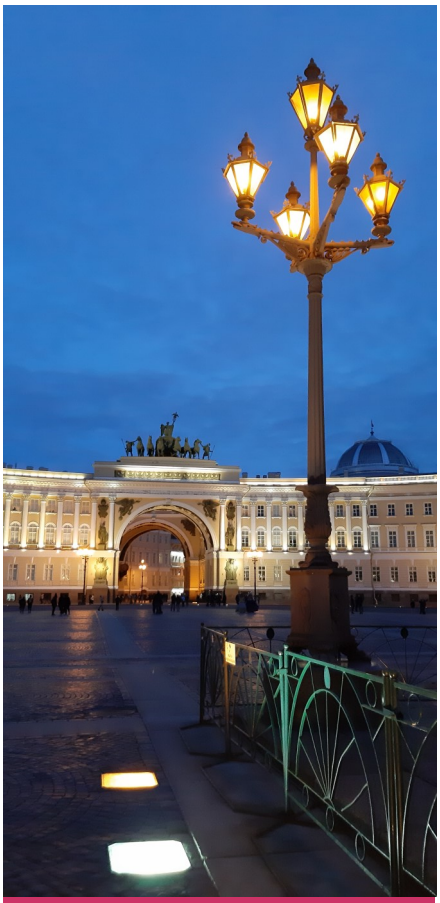
Tests procedure

As part of testing the tightness of the connection of process tubes with the heat exchanger tube sheet, a helium test was carried out.

Welding and expanding services

In addition to the production of shell-and-tube heat exchangers, we also undertake the services of expanding pipes in a tube bottom.

We have the appropriate equipment, orbital welding machine and approved welding technologies with methods 141, 142 for welding tubes in tube sheets.



Neva 2019

In 2019, we took part in the NEVA Maritime Fair, which took place in St. Petersburg from 17 to 20 September.

It was an opportunity to meet existing business partners and contact the new ones

Water treatment unit ZPWS type

Technical characteristics

Water treatment unit (ZPWS type) consists of water buffer tank, calorifiers, UV sterilizer, circulation pumps, filter system connected by pipelines, also control and measurement equipment in one module on a skid.

Materials

Materials for the components were selected in such a way to ensure hygiene requirements and PRS Classification regulations for the ship. The tanks were made of stainless steel, pump bodies with bronze, impellers of aluminum bronze and shafts with stainless steel, pipelines were made of copper.

SMM 2020 Trade Fair

We would like to invite you to our stand at the SMM 2020 Fair, which will take place in Hamburg Messe und Congress on September 8-11, 2020.

OUR STAND NO: B5.201

ORP Arctowski

Signing the contract with PGZ SW for the ORP Arctowski

In accordance with the signed contract, we carry out modernization of air conditioning and ventilation systems on the Polish hydrographic ship ORP Arctowski.

Multi - purpose vessel for Szczecin Maritime Office

Shell-and-tube water-cooled condensers

SPR and SPRZ condensers are components of refrigeration units for cold and freezing stores and also for chillers for air conditioning systems used on ships.

We make condensers with tube bundle made of low-finned copper-nickel tubes and special protection of the tube sheet and covers resistant to the corrosion of sea water.

HVAC system on multi – purpose vessels for the Szczecin Maritime Office

General contractor for HVAC

PBUCH was selected as the General Contractor for the design, supply and installation of ship ventilation, air conditioning, cold water installation and refrigeration installation of stores. We equip both vessels with air-conditioning units, chillers, fans and the entire ventilation system as well as whole assembly of air-conditioning cold water pipelines from chillers, to fan coil units with all necessary valves and safety equipment. We provide autonomous air conditioners to CMK and wheelhouses.

Due to the Ship owner's expectations, whole equipment must meet the quality requirements of the PRS Classification.

"The year 2019 was full of challenges that we carefully meet. Although it costs us a lot of hard work, we don't give up to adversity, but consistently move forward. Thanks to this, we develop and gain the acceptance of our customers who come back to us, and this is the most important! "

Robert Ufnal

Chairman of the Board

Contact Us

Contact us to learn more about our services and products:

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