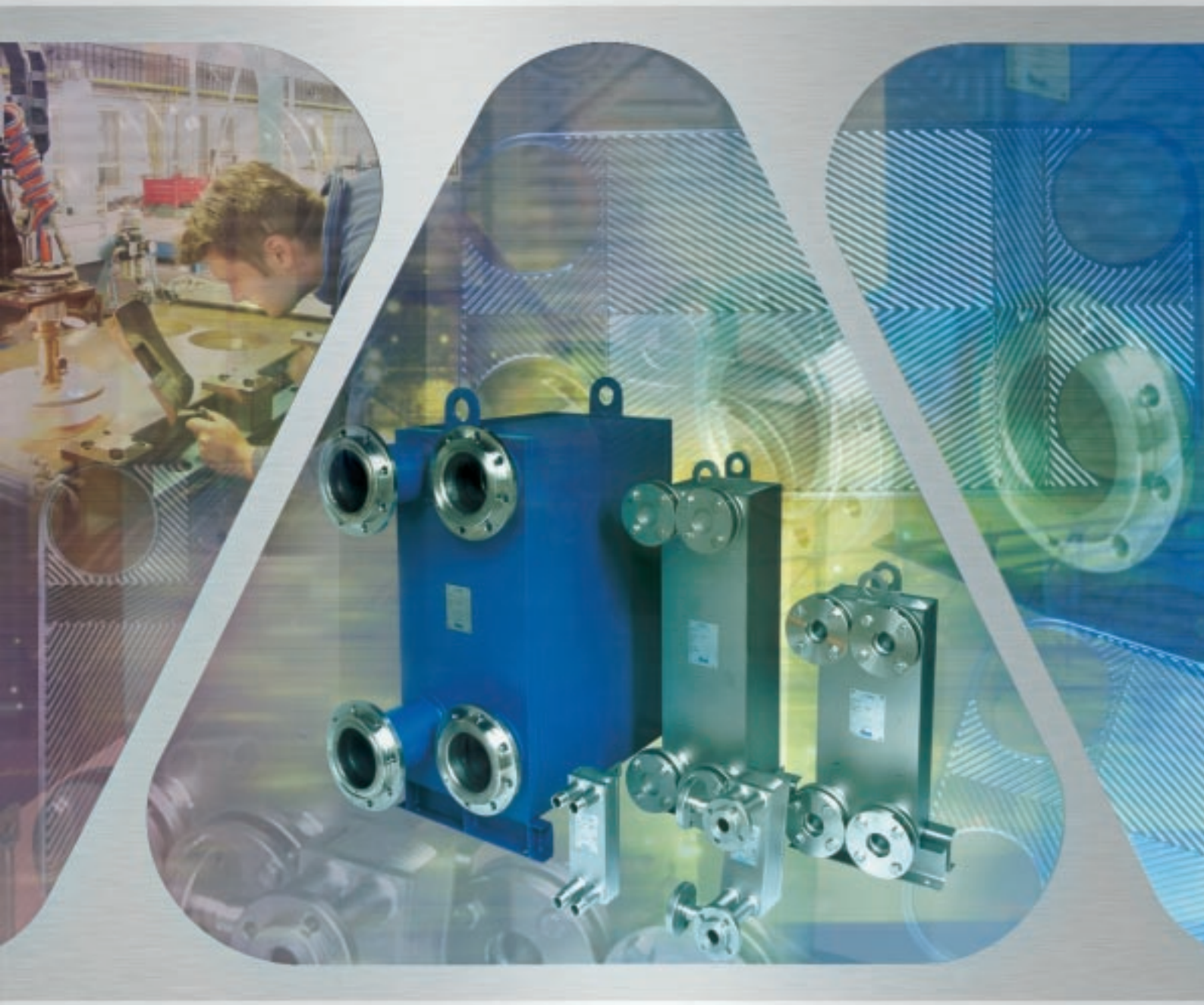
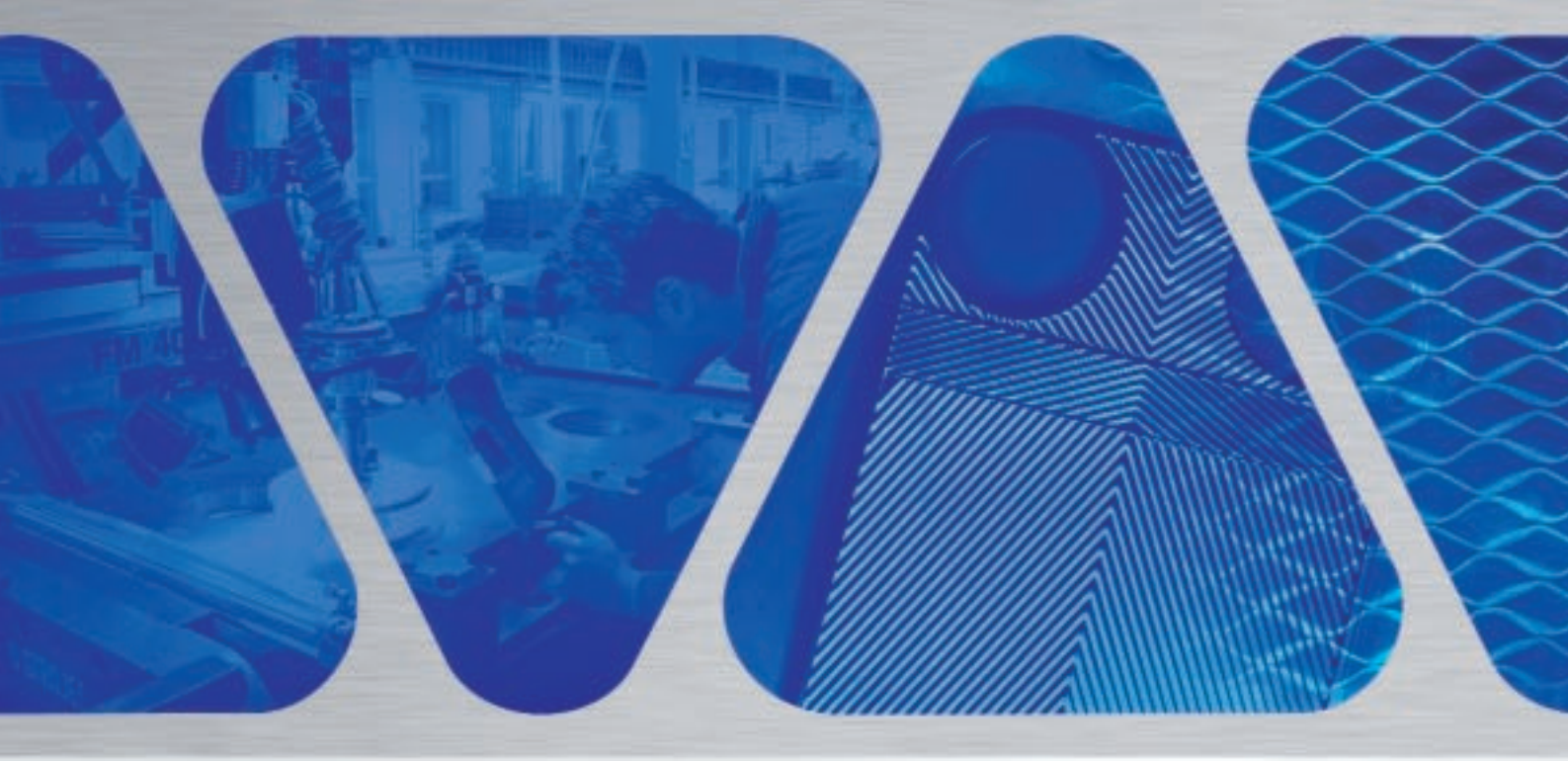


welded heat exchangers

TENEZ®



Introduction

One of the primary goals of the joint-stock company TENEZ is a satisfied customer. In our activities we apply both the custom-type manner of the production of devices and process equipment and batch production. The production and technical order processing is implemented in accordance to requests and needs of our customers. We are doing our best to establish as close contact with customers as possible with respect to incessant improvement of quality of our products and services. We put great stress on after-sale services such as servicing, consultancy activities, sale of spare parts and those activities are integral part of our company strategy. TENEZ a.s. has been awarded the certificate ISO 9001.

The company TENEZ a.s. was established in the year 1992. In its activity the company develops an almost fifty-year tradition of production and supply of stainless equipment from Chotěbořské strojírny.

By utilising high expertise and flexibility of our engineers and blue-collar workers the technical solutions are implemented on the highest level. In the area of realisation of our intentions it represents high requirements as regards the production of equipment. We use our own engineering, designing, manufacturing and assembling departments for fulfilling our aims.

In the beginning of nineties, TENEZ a.s. company in co-operation with its foreign partner, the company API Schmidt-Bretten, has completed the development of the welded stainless plate heat exchangers of ST type. Its great properties, high corrosion resistance, high intensity of heat transfer and possibility of high operation temperatures and pressures, are destined to be used in the most exacting heat transfer processes, for instance in the chemical and pharmaceutical industry. The company has registered patents on the type designs as well as the technological procedure of welding of the heat exchangers in the European Union and the United States.

Apart from the welded stainless plate heat exchangers, the part of our production programme is also the production of the plate dismountable heat exchangers which find their wide application in the food processing industry.

TENEZ a.s. company is a manufacturer and renowned supplier of the complete milk plants, parts of breweries, and the plants for the production of non-alcoholic beverages. The equipment produced in the company can be applied not only in the food processing plants, but also in the process equipment units for the chemical and pharmaceutical industry and power-plant engineering.

In addition to the piece production, the company provides for the complex solution of supply-investment activities. Higher supplying functions facilitate to ensure the design solutions as regards the individual designs of new equipment and modernisation as well as the complex solutions for new plants.

Export is a significant and substantial part of our turnover and represents more than 49% of the company production. The exchangers of ST line produced for our partner API Schmidt – Bretten find their application at the top world producers.

Therefore, we are supplying our products to customers in Germany, Austria, the Netherlands, Sweden, France, England, Slovakia, Poland, Russia, where the company has its business agency office, and also to Israel, Kuwait, Egypt, Japan, Argentine and the USA.

The quality of our products corresponds to the European and world standards. The company has acquired the necessary permissions for the production and export of pressure tanks according to the German TÜV a AD Merkblatt regulations, Austrian Ö-NORM standards, Polish UDT regulations, Slovakian ITI regulations and Russian GOST regulations. Our company is preparing also the certification in compliance with ASME Code for supplies in the American markets.

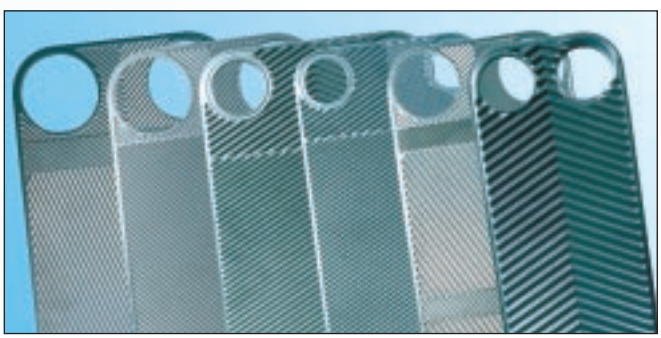
Welded heat exchangers

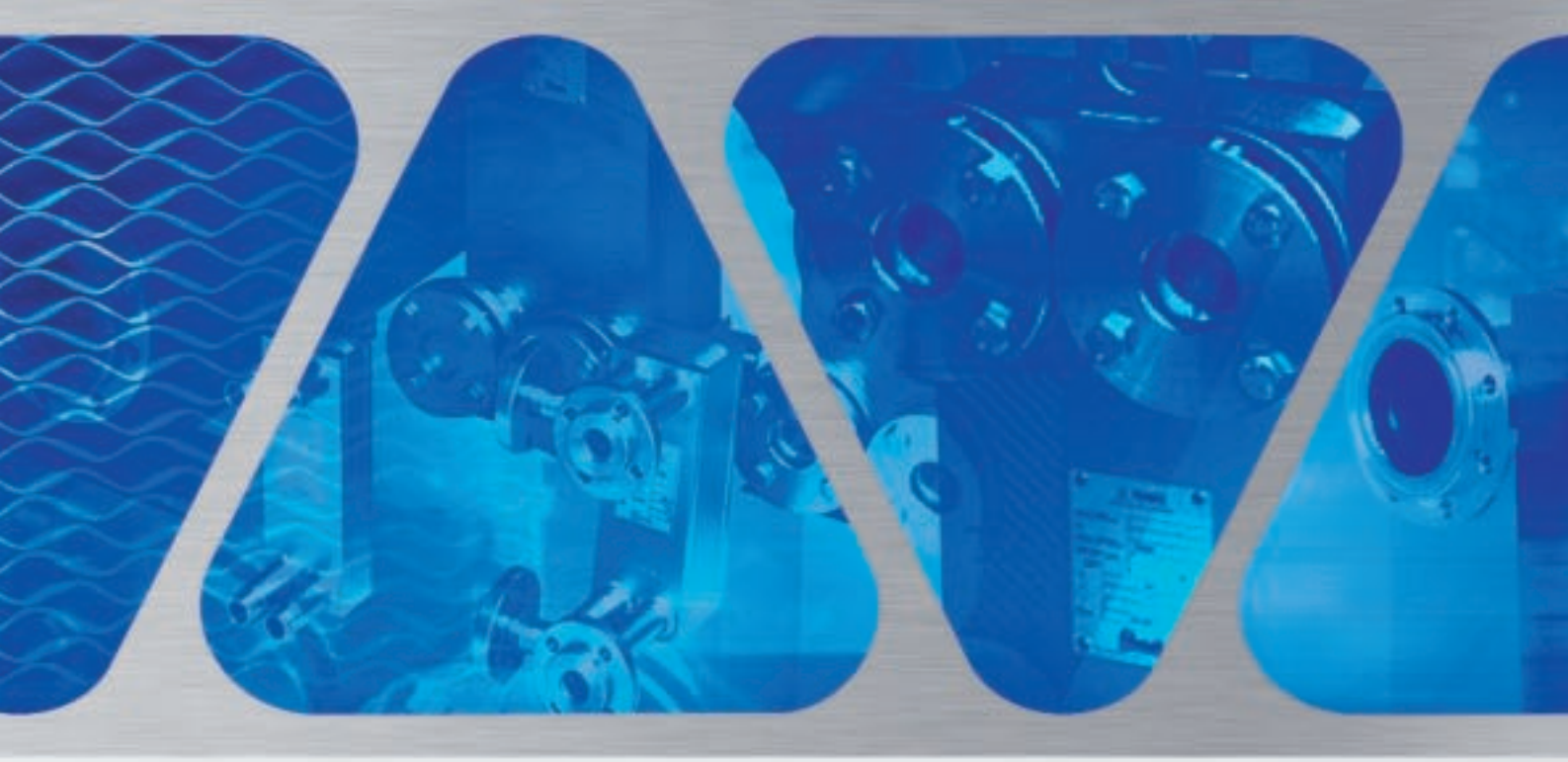
Material:

The basic operational part of the exchanger is the exchanger body made of heat exchange plates moulded of austenitic CrNiMo – stainless steel, or possibly of special highly alloyed steels or titan.

Plates:

The plates SIGMAWIG, as basic construction elements, essentially contribute to obtaining the excellent thermodynamic properties of the exchangers of ST type. Due to the optimum corrugation of their surfaces it is possible to achieve

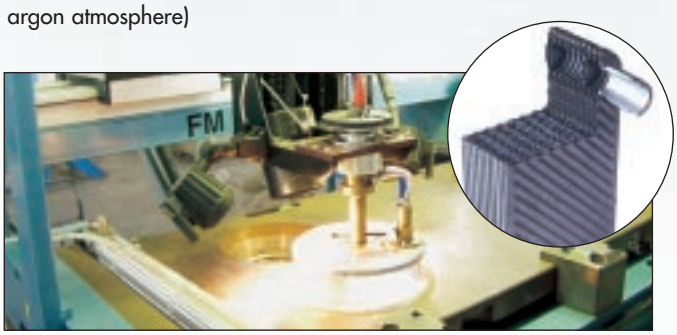




e.g. in the operation mode water-water an overall coefficient of heat transfer of up to 7000 W/m^2 °C.
By the arrangement of plates, two separated compartments are created, and between them heat is transferred. The operational surface of plates is polished, which together with highly turbulent flowing causes a minimal deposition of sediments and contamination.
Internal arrangement of the flow can be optimised with respect to the required intensity of heat transfer, maximum reduction of pressure loss, or possibly special requirements of cooling or heating process.

Modern technologies of plate welding:

The plates are welded to each other on the outer circumference and on the circumferences of the inlet holes by WIG method (e.g. by welding without excess material (filler) in the protective argon atmosphere)



The exchanger body is fitted with four necks which are also welded on by WIG method.

Jacketing

The exchanger body is tightened by jacketing. The plates of jacketing are proportioned according to the operation pressure. The material is of stainless steel, or of constructional steel on which the paint is applied.

Special design of exchangers:

For the needs of the process equipment which demand extreme conditions, the following special making of the exchangers are designed:
- for sudden changes of temperatures – the design eliminating arising of mechanical strains due to an unequal expansiveness of the body and parts of jacketing consisting in flexible connection in the place of the entry of necks into the head plate (the analogy of the floating head at shell and tube exchangers)
- for noiseless operation in the mode – steam – liquid – the exchanger with shock absorber is available

Thermal efficiency

Intensity of heat transfer and pressure loss of the exchanger also depend on the angle of the offset of corrugation and by this formed turbulent flowing. At some types of the exchangers the "hard" plates with larger angle of the offset of corrugation, or "soft" with smaller angle of the offset of corrugation are used, or possibly the combination of both types of plates.

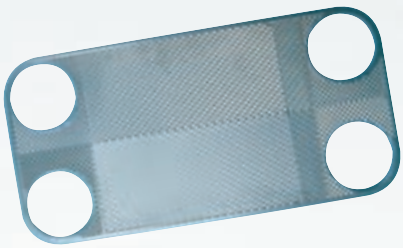


Plate T (hard) – lower heat transfer and lower pressure loss

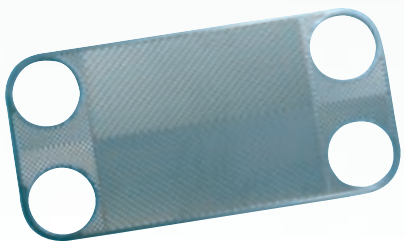


Plate M (soft) – high thermal transfer at higher pressure loss

Manufacturing programme

TENEZ a.s. company offers wide range of exchangers for all capacities, media and processes which are in demand.
The exchangers are produced in these five type lines: ST 3, ST 12, ST 18, ST 30 and ST 40
The various number of plates and the various plate types according

to the offsets form a number of possibilities in designs.
The exchangers can be produced in one-sided or double-sided connections. In standard designs, the exchangers are fitted with four necks in one face, according to the requirements of customers, the exchanger can be fitted with two necks in the front and two necks in the rear, or possibly in other demanded combinations. The exchanger body can be fitted with even more necks, or possibly in one body it is possible to realise more operation sectors.
Other neck may serve for deaerating, gas release, and as another inlets etc.

The advantages of stainless welded exchangers:

- no sealing materials
- thermodynamic and hydrodynamic conditions in the exchanger can be optimised by internal arrangement of flow so that the combination of parallel and serial arrangement of the through-flow drains was possible
- high resistance against chemically aggressive through-flowing media in comparison with soldered exchangers
- suitable for use at the heat exchange water – steam, where great differences in input temperatures occur
- high resistance against an aggressive environment and through-flowing media due to the patented technology of joints welding by the method WIG
- high efficiency of heat transfer surfaces by means of technically state-of-the-art plates SIGMAWIG
- high operation temperature and pressure – up to 4,0 Mpa and 300°C
- small dimensions, easy installation
- high resistance against aggressive substances at cleaning, it is possible to use normally available chemicals for favourable prices (e.g. nitric acid, sodium hydroxide), which cannot be used for instance at the exchangers of soldered coppers.
- long service life, minimum and easy maintenance and servicing

Fields of application:

- heat exchange in the chemical and pharmaceutical industry
- the heating systems – delivery stations for UT and TÚV application water – water, water – steam
- the area of process equipment with a need of heat transfer
- the air-conditioning systems and the systems of thermodynamic heating
- the cooling equipment – evaporators, condensing units
- heat exchange in the food processing industry
- water heating
- the equipment for the recuperation of heat
- health-resort (bath) equipment
- beverage industry
- sanitation and medicine equipment
- laser equipment

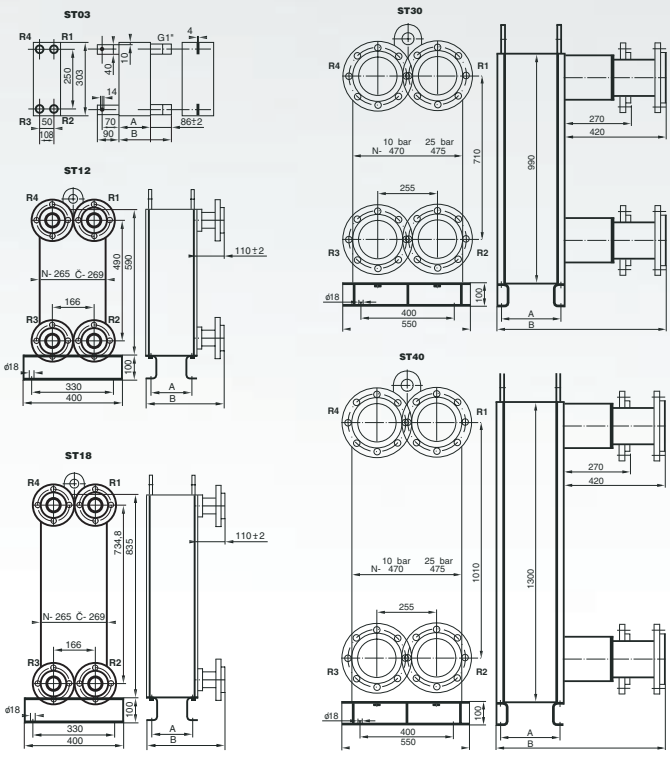


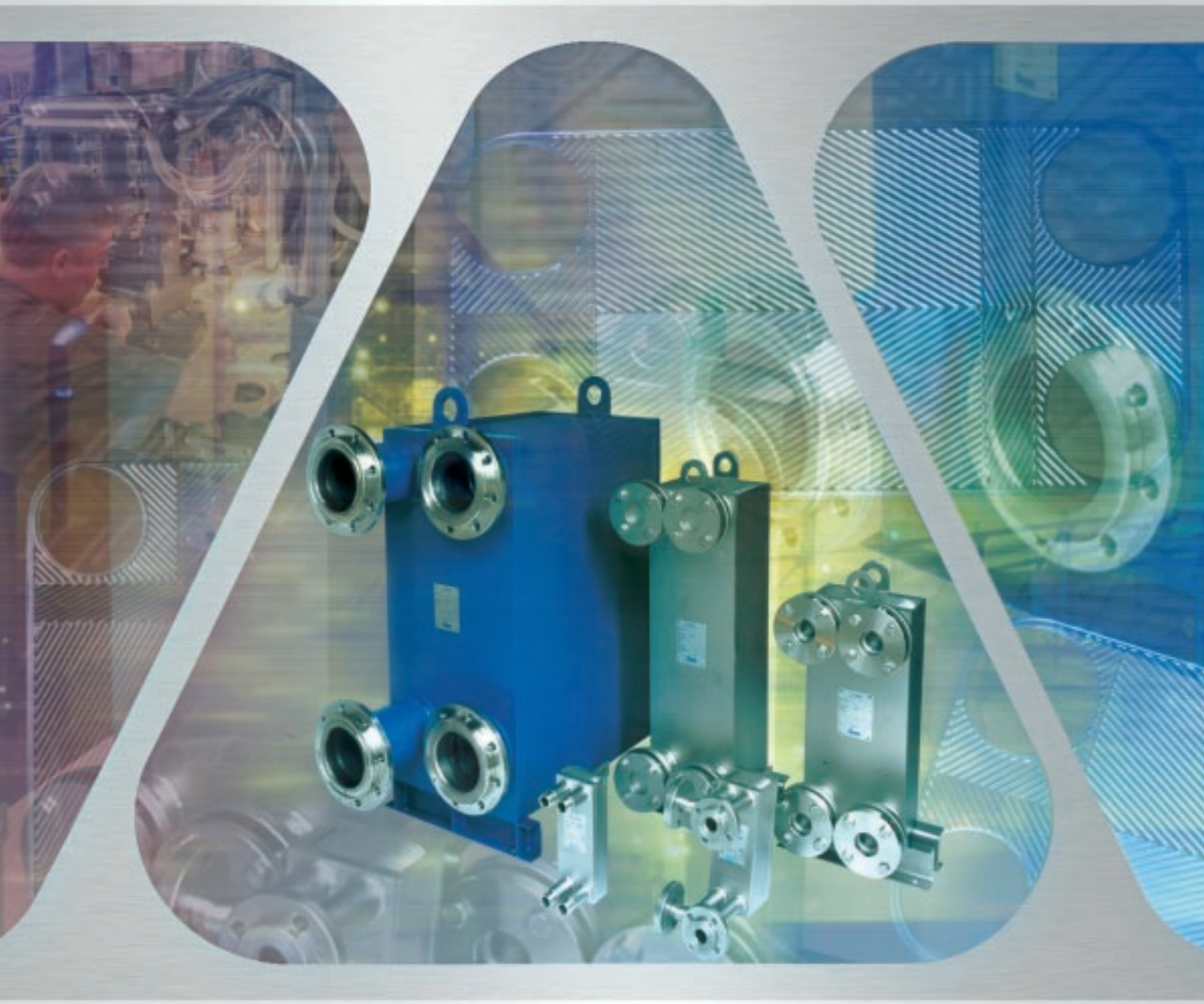
Chart of technical parameters

Basic technical parameters for type designs

Welded plate		ST 3	ST 12	ST 18	ST 30	ST 40
Number of plates	pieces	12-120	16-120	16-120	16-200	16-200
Heat transfer surface	m^2	0,2 - 2,7	2,0 - 16,5	3,4 - 25,3	4,8 - 60,8	7,3 - 91,6
Maximum operation over-pressure	bar	10/25	10/25	10/25	10/25	10/25
Minimum operation over-pressure	bar	-1	-1	-1	-1	-1
Maximum operation temperature	°C	250	250	250	250	250
Minimum operation temperature	°C	-195	-195	-195	-195	-195
Maximum flow rate	m^3/h	8,5	35	35	450	450
Length A	mm	50-340	100-385	100-385	150 - 770	150-770
Length B	mm	140-420	230-495	230-495	410-1260	410-1260
Connection DN/G	mm / "	25/ 1"	50 / 2"	50 / 2"	150 / 6"	150 / 6"
Internal volume I	dm^3	0,3 - 2,7	2,1 - 16,0	2,9 - 21,7	6,8 - 85	9,36 - 117
Internal volume II	dm^3	0,2 - 2,7	1,9 - 15,7	2,5 - 21,4	5,9 - 84,1	8,2 - 115,8
Weight	kg	9-25	100-177	136 - 247	400-1050	500-1310

Range of achieved values of overall coefficient of heat transfer in W/m^2 °C /

	Type of exchanger				
Operation mode	Exchanger TENEZ ST	Exchanger "Tube bundle"	Two-pipe exchanger	Coil exchanger	Laminated plate exchanger
Liquid - Liquid	2000 - 7000	150 - 1200	300 - 1400	1700 - 2300	
Liquid - Gas 1 bar	40 - 600	15 - 70			20 - 60
200 bar	-	200 - 400			
Gas - Gas 1 bar	20 - 300	5 - 35	10 - 35		10 - 35
200 bar	-	150 - 500	150 - 500		
Steam - Liquid	1500 - 5000	1500 - 4000	400 - 2000	900 - 3000	
Condenser - Water steam	1500 - 5000	1500 - 4000			
- Hydrogen nitride	1500 - 4000	200 - 800			
- Chlorine halide	1000 - 2500	150 - 700			
Evaporator - Water steam	1000 - 4000	600 - 3000			
- Hydrogen nitride	800 - 3500	200 - 1500			
- Chlorine halide	600 - 3000	150 - 900			



Individual approach towards customers:

For the calculation of the type of exchanger for a given application, TENEZ a.s. company utilises the official software.
In case of request for the exchanger design for a given application we should be pleased to send you by return the calculation that is made with high precision by means of computer programmes based on careful and solid thermodynamic and hydrodynamic measurements.

The bases for the calculation are the following parameters:
- operation temperature mode
- through-flow rate or amount of heat transferred
- operation pressure mode, possible reductions of admissible pressure losses
- through-flowing media or their physical properties

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