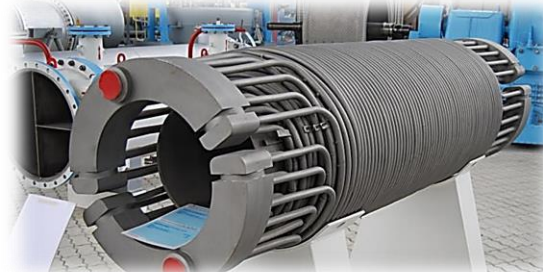


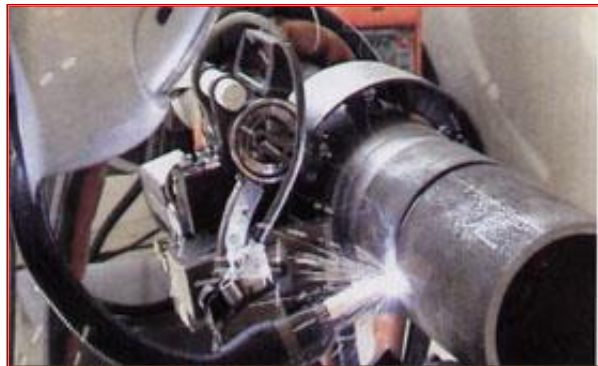
# SMNPO – ENGINEERING

## MANUFACTURING CAPABILITIES

### BOILING-AND-WELDING FACILITIES



# EQUIPMENT AND PROCEDURE FOR WELDING OF HEAT EXCHANGER TUBES AND TUBE SHEETS AND WELDING OF TUBES FIXED BUTT WELD



Performances of machine	"FRONTUS" machine, Austria	"ESAB" machine, Sweden	"POLYSOUDE" machine, France
	Tube-tube sheet		Tube – chamber tube sheet through hole M30
Supply power, kVA	9	24	5
Welding current, A	2 ÷ 200	10 ÷ 400	5 ÷ 300
Operating voltage, V	10 ÷ 18	10 ÷ 24	5 ÷ 24
Welding tip type	TS 2000 MU IV 19-80	A 21 A 22	TS 200 AVS with nozzle HUDSON
Diameter (inner) of tubes to be welded, mm	10,5 ÷ 60,0	10 ÷ 76	10,5 ÷ 60,0
	19 ÷ 80	10 ÷ 76	19 ÷ 80
Tubes wall thickness, mm	0,7 ÷ 2,0	0,7 ÷ 2,0	0,7 ÷ 2,0
Quantity, pcs.	2	2	1

Material : tubes  
tube sheets

– carbon, stainless steel, titanium alloys;  
– carbon, stainless steel, titanium alloys.

## AUTOMATIC SUBMERGED ARC WELDING

This welding is used at steel of different structural classes welding. Depending on the purpose over 20 brands of welding wire and 10 brands of flux are used

Equipment description	Quantity	Products dimensions			Load-lifting capacity, ton
		Diameter, mm	Length, m	Thickness, mm	
Turning rolls	8	600÷4800	Up to 40	4÷150	10÷60
«Deuma» (Germany) welding machine with manipulator load-lifting capacity: 7, 10, 20, 25, 50, 75 and 100 tons	28	400÷4000	Up to 15	10÷250	7÷100
Machine for coiled tanks welding	1	7000÷20000	Height up to 20	4÷16	-
Machine for frame welding	2	-	Up to 20	8÷30	-
Machine for longitudinal seams welding	10	600÷4800	Up to 20	4÷150	-
Machine for girth seams welding	2	650÷8000	до 20	4÷250	Up to 100
Machine for girth seams welding	1	600÷7500	до 20	4÷250	Up to 60



## ELECTRIC SLAG WELDING

This welding is used for manufacturing of carbon, low-alloy and high-alloy steel products with 30÷500 mm thickness.

It is high-efficient at welding of products with over 50 mm thickness.

Products weight is unlimited

Equipment description	Quantity	Products dimensions		
		Diameter, mm	Length, m	Thickness, mm
Machine for longitudinal seams welding	6	≥ 400	Up to 4	
Machine for girth welds welding	2	≥ 1200	Up to 4	50 ÷ 150
Machine for petal-type bottoms welding	1	1200 ÷ 4000	-	30 ÷ 80
Machine for flange welding	2	400 ÷ 4200	-	30 ÷ 250
Machine for oversized products welding	1		Up to 4	50 ÷ 500
Electro slag unit	2	It is used for melting of high-quality steel and non-ferrous billets		



## SEMI-AUTOMATED GAS-SHIELDED WELDING

This welding is used at carbon, low-alloy, high-alloy steels, aluminium and aluminium alloys welding. Shielding gas: CO<sub>2</sub>, mixture of argon and carbon dioxide (80%Ar+20%CO<sub>2</sub>, 98%Ar+2%CO<sub>2</sub>). Welding wires are flux cored and solid section type.

Machine description	quantity	Performance	
		Rated current, A	Control of wire supply speed
VR-4000 with TPS («FRONIUS», Austria)	6	400	Programmed smooth
MXF 65 with FastMig Pulse-450 («Kempfi», Finland)	1	450	Programmed smooth
VR-3000 with VS-5000 («FRONIUS», Austria)	70	500	Programmed smooth
Lorch P4500	4	450	Programmed smooth
«Vario-Star» VST-457 («FRONIUS», Austria)	43	450	Programmed smooth
MF 33 с FastMig KM-400 ( «Kempfi», Finland)	1	400	smooth
500 CPL ( «Powwel», Korea)	6	500	smooth
ПДГО-510 («SELMA», Ukraine)	90	500	smooth



## ELECTRON-BEAM WELDING

This type of welding is used for welding of products of stainless steel, titanium and aluminium alloys.

**Maximum thickness of products to be welded, mm**

- stainless steel	–	60
- titanium alloys	–	90
- aluminium alloys	–	100



**Electron-beam machine for oversized products welding:**

Chamber volume – 60m<sup>3</sup>

Electron-beam gun power – 60 kW.

Performances of machine	ЭЛУ-21	ЭЛУ-ИР1	ЭЛУ-ИР2	ЭЛУ-5	ЭЛУ-10
Electron-beam gun model	ЭЛА 60Б	ЭЛА60/60	ЭЛА60/60	ЭЛА 60В	ЭЛА60/60
Beam power, kW	60	60	60	60	60
Accelerating voltage, kV	60	60	60	60	60
Beam current, mA	1000	1000	1000	1000	1000
Dimensions of products to be welded, mm	Ø 1500 l – 1800	Ø 1300 l – 1300	Ø 600 l – 1200	Ø 200 l – 400	Ø 1100 l – 1200

# ELECTRICAL RESISTANCE AND FRICTION WELDING

Electrical resistance welding is used for manufacturing of products of different shapes sheet structures, bellows units, honeycomb seals, tools.

1. To manufacture panel structure resistance spot and seam welding is used.
  - Structure material: carbon, stainless steel, titanium alloys;
  - Welded material thickness, mm 0.5 – 3.0;
  - Equipment: machines of MT-2202, MШ-3208 types.
2. Bellows units welding:
  - Welded bellows diameter, mm – 18 – 322;
  - Bellows material – steel of 18 – 8 type;
  - Bellows wall thickness, mm – 0.12 – 0.80;
  - Equipment: machine of MШПС – 75, MШ – 3208 type.
3. Honeycomb seals:
  - Material – steel of 18 – 8 type;
  - Thickness, mm – 0.10 – 0.20.
4. Friction welding (welding of shank end to the tool):
  - Shank end diameter, mm: 16 – 40;
  - Equipment: machines of MCT type.



## GAS-THERMAL HARDENING AND PROTECTIVE COATINGS



Material of protective coatings – aluminium wire A5.

Ground material – carbon steel.

Equipment: machine for arc spraying of ARC-140/S 450; ҚДМ-2; ЭМ-12; ЭМ-14 types.

Hardening coating material – powder ПР Н70Х17С4Р4.

Ground material - Monel metal HM-40A, stainless steel.

Equipment: «МЕТКО-7М» machine, company «МЕТКО», Switzerland

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## VACUUM MELTING PROCEDURE AND EQUIPMENT

Vacuum techniques are used in the Company at manufacturing of turbo-compressor trains impellers, plate-finned heat exchangers, carbide blades melting as well.

### 1. Turbo-compressor trains impellers melting:

- Impeller material – steel 07X16H6
- Welding alloy – ПЖК – 1000 (palladia)
- Soldering temperature, °C – 1250.

### 2. Melting of plate-finned heat-exchangers used for oil cooling:

- material – aluminium alloy АМЦ;
- Welding alloy – sheets silumin of АМЦ alloy coating;
- Soldering temperature, °C – 615-620.

### 3. Melting of carbide blades TH - 20 for hardening of screws :

- Blades material – TH - 20;
- Sectors material – stainless steel, carbon steel;
- Welding alloy – ВПР – 2 (ПР-Д70Г24Н5);
- Soldering temperature, °C – 980.

### 4. Quantity of vacuum furnaces of different types, pcs. – 15.

