



CJSC "Pskovelectrosvar"



Concern "INTERSVAR"



STANDARD PROJECT RAIL WELDING PLANT

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Contemporary requirements to railways as far as transportation, safe and regular train operations with maximum allowed speeds, axle loads and train masses determine the necessity to build railways without bolted rail joints.

Manufacturing of continuously welded rails with subsequent laying in track is carried out in conditions of a specialized rail welding plant.

We present here a standard project of the rail welding plant which provides for manufacturing of continuously welded rails from rails of different types and sorts of steel.

The rail welding Plant consists of access tracks, a raw-material storehouse, a production building with installed equipment, and of auxiliary premises attached to the production building.

The main production building is made of frame metal constructions standing on the foundation which is made of monolithic reinforced concrete. The outer walls are made of wall panels with insulation against heat loss and with window units of metal-plastic multiple glass panes. The roofing is made of assembled profiled sheet with thermal insulation and vapor barrier. The floor is made of monolithic reinforced concrete with various covering depending on the production purpose of the room.

The building is equipped with the following systems: water supply and sewerage, heating and air-conditioning, cold supply, electricity supply, air supply, communication, automatic fire alarm and loud speaker communication.

Along the process line of the production building there

are administrative, utility, industrial and auxiliary premises of various purposes. In the premises there are ventilation installations, transformer substation, compressor room, store rooms, auxiliary workshops, medical aid station, offices, cloak-room, showers, WC, cafeteria, store-rooms for spare parts and tools, etc.

The design of the rail welding plant and the arrangement of the technological equipment depend on the following parameters:

- the rails are new or used;
- the length of the rails;
- the maximum length of the continuously welded rails;
- climate conditions;
- area allotted for the construction of the rail welding plant and etc.

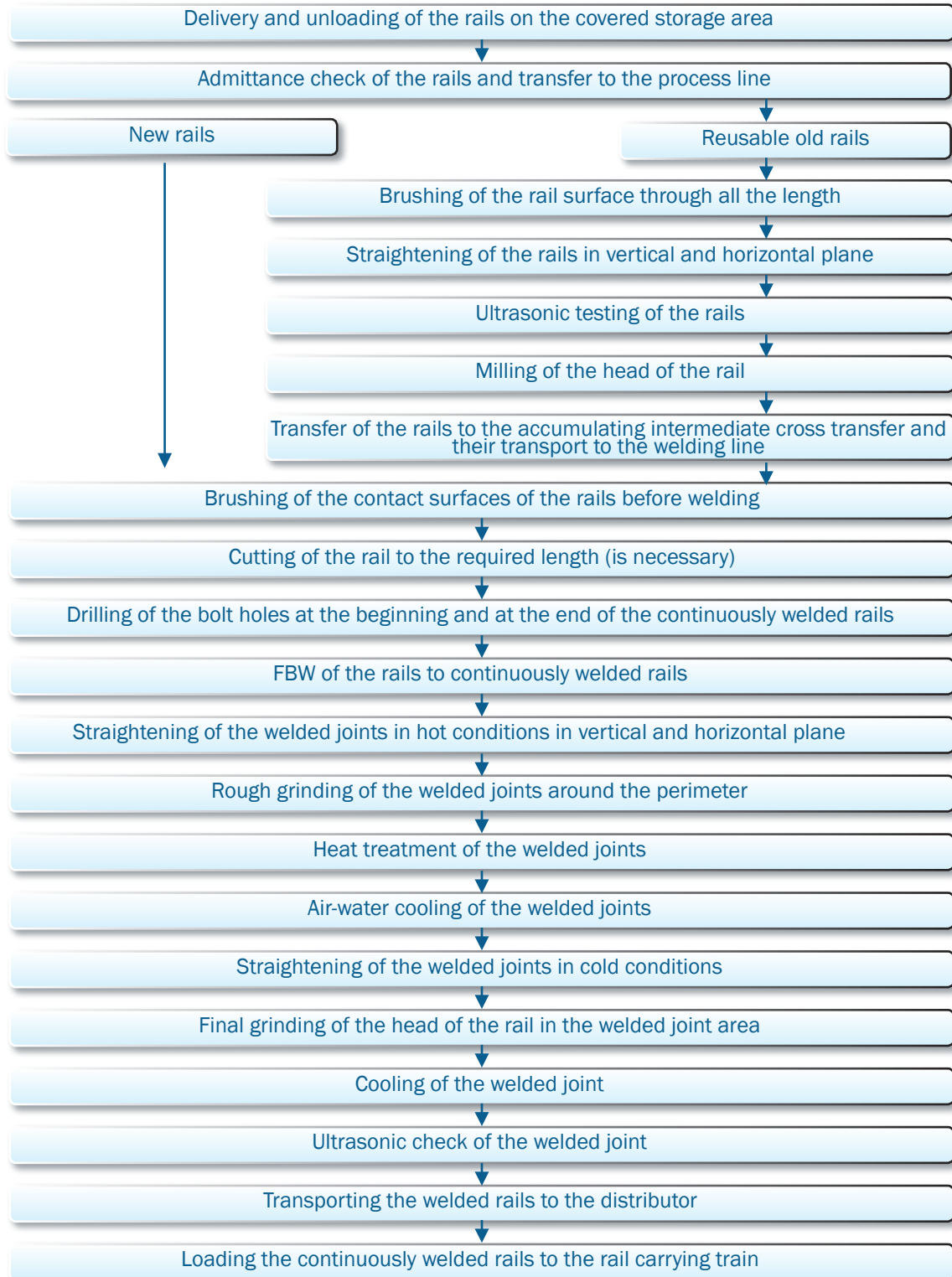
The general principles of work arrangement of the rail welding plant concerning welding of the continuously welded rails remain invariable, but some peculiarities are formed in each specific case in accordance with the basic parameters and the client's requests.

Using a complex approach to the satisfaction of the client's needs, we manufacture and deliver new rail welding equipment, carry out supervised installation and startup works, training of the personnel, accomplish thorough repairs and modernization of the welding equipment of our own production, as well as that of other manufacturers, warranty and post-warranty service, spare parts supply.

Standard process flow scheme

The experience in works on constriction of the rail welding plants and on implementation of the technology of FBW of rails has shown that for manufacturing of

continuously welded rails, it is advisable to use the following scheme of the technological process:



Technological process of the rail welding line

The rails are delivered through the technological railway access track or by cars. They are unloaded and stored in the storage area. The capacity of the storehouse makes it possible to keep a monthly demand of rails necessary for the operation of the rail welding plant.

The storehouse is a sheltered room made of profiled sheet; the room has drive-through passages. The rails are unloaded by remote controlled electric hoist with special grippers to the horizontal landing in stacks, between the stacks there are universal roller transfer sections CYPT-01. The sections are intended for transportation of a continuously welded rail through the technological rail welding line.

The sections are equipped with power and control electric equipment which is connected to a united linear circuit with an output for control desk at each station. Each roller transfer line is a united uninterrupted technological chain from one station to another one.

The section allows transporting insulated rails joint with combined metal composite fishplates.

Before being transferred to the line, the rails go through admittance check. The acceptance stamps and marks are checked. The surface defects are checked visually.

The rails are loaded to the technological line by remote controlled electric hoists with special grippers (similar to unloading in the storage area).

From the storage area the rails are transferred to the brushing operation by driven roller sections.

The brushing of contact surfaces of the rails before welding is carried out by the machine C3-03 simultaneously on two connected rails, thus ensuring reliable electric contact.

The cleanness of the treated contact surface meets contemporary requirements to FBW. It permits to obtain optimal electrical parameters of the heat balance of flashing, which ensures good quality of welded joints.

The machine consists of the brushing facility, the control cabinet and the filter and ventilation facility.

The machine allows transporting insulated rails joint with combined metal composite fishplates.

If it is necessary, the rail is cut to the required length by means of rail cutting machine, and test samples of the rails are cut for testing of the welded joints, blanking of faulty

joints. The sawing frame of the machine is placed on two pillars, which considerably improves machine rigidity and precision of cutting.

Three bolt holes are drilled at each end of the continuously welded rails. The drilling of the holes is made by the portable rail drilling machine installed on a special roller section. The machine provides automatic feeding and adjustment of the height of the drill, it is equipped with durable spiral drills, fast clamping device and clamping gauges for the rail bosom of different types of rails.

After drilling the rails are transported to welding operation by driven roller sections.

The welding is carried out by the machine MCP-63.01A, designed for FBW by continuous and pulsating burning off of the rails in stationary plant conditions. The machine provides centering of the rails according to the axis of the rails and to the height of the rail head before welding, welding as well as weld flash removal around the perimeter of the joint immediately after welding.

Operating control system of the machine is made on the basis of an industrial computer and ensures:

- setting and checking of technological parameters which determine the quality of the welded joint;
- condition check of executive mechanisms of the machine;
- condition check of electric power part of the machine;
- providing the operator with information about the welding process in real time mode;
- storing and keeping welding process information for each welded joint;
- issue of passport (report) for each joint;
- self checking and self diagnostics.

Harmful emissions generated by welding are localized and removed by the local exhaust ventilation.

Requirements don't permit to limit the safety of the railway transport only to a passport of the welded joint issued by the welding machine. A selective checking of compliance with the set up welding mode controls the quality of welded rails joint by means of testing check samples for static transversal bending on the special compact press PMC-320.

Control system of the press is made on the basis of an industrial computer. It allows recording and storing data of the test process of the welded joint, registers every fracture, displays the load curve of the process and allows controlling the process in real time mode.

The press allows transporting insulated rails joint with combined metal composite fishplates.

The press is installed outside the technological line near the welding machine.

The welded rail joint is transferred to the hot joints straightening unit УПС-02. The facility is designed for straightening of the hot welded joint to meet the requirements to the geometry of the rolling surface and of the rail head. The facility straightens the rail in horizontal and vertical plane on the base length of 1 700 mm. The straightness of the rail joint is checked on the rolling surface and on the working side of the rail head.

The frame УПС-02 has two support rollers on which the rail moves, two hydraulic cylinders for straightening in the horizontal plane, hydraulic cylinder for straightening in the vertical plane. The connecting rods have rollers and lugs which limit the movement of the rail during straightening. Control of the movement of the hydraulic cylinders lugs is accomplished by the joystick in four directions.

The facility allows transporting insulated rail joint with combined metal composite fishplates.

After straightening, the rail is transported to the operation of rough grinding of the welded joint.

At the stationary rough grinding station ПГШ-01, the grinding machines carry out abrasive treatment of the joint around the perimeter at the same level with the main profile along the rail. The rough grinding station is a cabin equipped with local input-exhaust ventilation.

The station of rough grinding allows transporting insulated rail joint with combined metal composite fishplates.

The set of grinding machines for the rough grinding station consists of one floor-mounted machine and of two suspended machines.

The driving force which is necessary for further movement of the continuous welded rails along the rail welding line is provided by the pulling unit УТ-01. The drivers of the roller transfer sections are automatically switched off during the operation of the facility, which ensures electricity savings.

The facility allows transporting insulated rail joint with combined metal composite fish plates.

The rail joint is transported to the operation of heat

treatment of the welded joint by means of the unit УТ-01.

The heat treatment of the welded joint is carried out by the high frequency inductive heating unit (УИИ).

The process of heat treatment is a uniform heating of the rail section in the welded joint area to a given temperature, with following tempering through forced cooling by compressed air.

The control unit of the technological process of heat treatment ensures a complete automation with minimal participation of the operator and fulfills the following functions:

- unit control in two modes: manual and automatic;
- setting and checking the heat treatment parameters: temperature of heating, time of heating, frequency convertor power, time of tempering, air pressure in the tempering device;
- technical condition check of the unit equipment by signals from sensors and end switches;
- creating, accumulating and storage of passport data (information about proceeding of the heat treatment process) for each welded joint with a possibility of printing out;
- creating a shift report on the results of the operation of the unit during a shift with a statement for each joint (fit/unfit) with a possibility of printing out the report after the end of the shift.

Additional cooling of the joint is carried out at the air and water cooling units.

After the heat treatment and cooling, cold straightening of the welded joint is carried out at the cold straightening unit УПСХ-01 to match the required geometry of the rolling surface and of the rail head.

The unit straightens the rail in horizontal and vertical plane on the base length of 1 300 mm, checking the rail deflection on the length of 750 mm by laser sensors.

The unit allows transporting insulated rail joint with combined metal composite fish plates.

The final grinding of the welded joints on the roll surface and lateral sides is carried out at the final grinding station (ПЧШ-01).

The final treatment of the welded joint to the required geometry and smoothness is carried out by means of the

grinding machine. The final grinding station is a cabin equipped with local input-exhaust ventilation.

Final grinding station allows transporting insulated rail joint with combined metal composite fish plates.

After the final grinding, the joint is cooled in the water cooling unit.

The further movement of the continuously welded rail along the welding line is provided by the modular pulling transporter TT.

The pulling transporter is designed to transport continuously welded rails, as a part of the rail welding plant process line. The control system of the transporter is based on an industrial computer. The conveying speed of the continuously welded rail and the driving force of the transporter are determined by the variable frequency drive.

Depending on length of the continuously welded rail, the pulling transporter is made in two versions: TT-02, consisting of four modules, and TT-03, consisting of five modules.

The transporter allows transporting the insulated rail joint with combined metal composite fish plates.

The pulling transporter passes through continuously welded rail only after bolting it to the previous one. This operation is carried out in special section using special fish plates, which provides pulling the continuously welded rail on a special rail carrying train.

By means of the transporter, the welded joint is carried to the ultrasonic control operation.

The quality check of the welded rail joints is carried out by the automatic multichannel defectoscope for ultrasonic

check МИГ-УКС. The defectoscope checks the whole rail section (including rail foot blades) by means of 86 check channels. The pattern of the ultrasonic test of the joint enables to detect defects of various form and orientation.

The detecting system includes five blocks of resonators, one of which is situated on the roll surface of the rail head, two on the lateral surfaces of the head and two on the upper surfaces of rail foot blades. Before checking the welded joint, acoustic contact under each sensor is checked out automatically. The check results for each joint are saved in the memory of the defectoscope in form of protocols. The display program of the defectoscope МИГ-УКС enables monitoring and printing out the check protocols which contain detailed defectoscopic and service information through all the channels, as well as creating an electronic passport (report) of the continuously welded rail.

In case of rejection, the welded joint is returned to the operation of joint cutting out. The cutting out is made by the rail cutting machine, situated in the process line between the rough grinding station and the station for the heat treatment of the joint. After that, the ends of the continuously welded rail are returned to the station of brushing of the contact surfaces.

After the ultrasonic check, the continuously welded rail is carried to the transporter-distributor of continuously welded rails ТРП-01 by means of the pulling transporter.

Transporter-distributor allows transporting the insulated rail joint with combined metal composite fish plates.

Using the turn guides of the transporter-distributor, the continuously welded rails are loaded on a special rail-carrying train, which carries long continuously welded rails to the layout places.



Technological process of rail recovery line

The incoming old rails are offloaded in a special storage area where they are preliminary checked and assorted. The rails are assorted according to the side of the head that is subject to milling work.

The rails appropriate for further usage are laid down on the live roller and carried to the brushing station where their entire surface is cleaned from grime and rust by metal scrapers and brushes.

The cleaned rails are carried to the operation of straightening. The straightening is carried out in two planes by the rail straightening press with the rail turnover device.

The straightened rails are carried by the live roller to the station of ultrasonic defectoscopy where internal defects of the rails, such as cracks, cleavages and etc., are detected.

The ultrasonic defectoscopy of the rails is carried out by

the defectoscope when the rail is moving at low speed.

All detected defective areas of the rail, as well as areas with bolt holes in them, are cut out on the rail cutting machine. After cutting, the rails must be not less than 7 meters long; otherwise they are dispatched to scrap.

The accepted rails are carried to the rail milling machine for reprofiling of the worn-out rail head, i.e. roll surface and lateral surface of the rail head. The milling of the rail head is carried out while the rail is moving under the milling heads, which enables milling of rails of any length. One milling head treats the roll surface of the rail head, the other – the lateral facet of the rail head.

After milling the rails are carried by the live roller to the buffer transfer and are transported to the welding line.

Labor safety

The production procedures in the rail welding plant pertain to the groups 1a, 1б, 1в and 2б of the production procedures according to the construction regulations СНиП 2.09.04-87.

The attending personnel are provided with amenity rooms according to the construction regulations СНиП 2.09.04-87 (article 2.5), a medical aid center and a room for having meals.

The technological flows for manufacturing continuously welded rails operate in semi-automatic mode and are provided with interlock system, light and audio alarms and radio communication.

The lighting of the production areas, auxiliary and administrative rooms, meets the standard requirements for lighting. The individual lighting of work site is provided at the stations of brushing, welding, rough and final grinding, defectoscopy.

The dust and harmful gases emitted at the stations of brushing, welding, rough and final grinding are localized and removed through a system of centrifugal collectors and filters by the local exhaust ventilation. All production, administrative and auxiliary rooms are equipped with shared input-exhaust ventilation.

The production procedures on the line are not accompanied by noise emission above the permissible level. Tubular silencers are installed on the inlet and outlet sides to extinguish the noise from the fans.

To assure electrical safety, there is provided installation of an earthing network and connection of metal parts of equipment and structures to it.

Temperature conditions in production, administrative and auxiliary rooms are provided with heating and air-conditioning system, input-exhaust ventilation and conform to the standard rates.

Welding machines are provided with protective shields preventing spreading of sparks produced by welding.

Specially trained and certified personnel without medical contra-indications are qualified to work on the production sites.

The entire personnel of the rail welding plant must go through safety trainings and observe established technological regulations.

Handling operations in the rail welding plant will be carried out by means of small-scale mechanization: platform carriages, hydraulic cranes, self-propelled stackers and electric loaders. The rail welding plant is equipped with internal fire-fighting water supply according to СНиП 2.04.01-85, primary firefighting appliances and fire alarm system.

The adopted engineering solutions provide safe operation of the site for human life and health and for the environment.

Industrial requirements of the rail welding plant

DESCRIPTION	TECHNICAL DATA	SOURCE	SPECIFIED (REGULATED) VALUES	UNITS OF MEASURE	CONSUMPTION FOR OPERATING NEEDS			
					per hour		per year	
					light	power	light	power
Electricity	380 V, 220 V, 50 Hz	transformer sub-station	380 V, 220 V, 50 Hz	MW, MW*h	107,4	1466	698,4	5527
Service and drinking water	0,6 MPa	eternal supply line	-	m ³	2,47		3 237,55	
Compressed air	0,8 MPa	compressor station	0,8 MPa	m ³	1 100 max. 474 average.		-	
Circulating water	0,6 MPa	water cycle system	0,6 MPa	m ³	0,46 for replenishment		4 011,35 for replenishment	

Machinery list

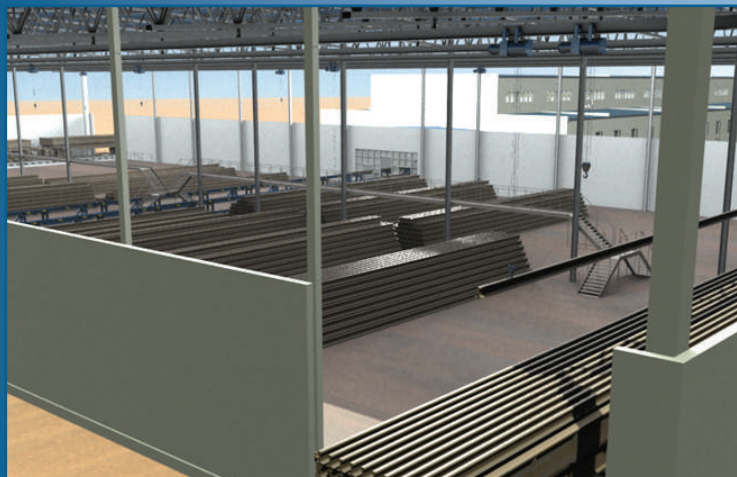
Rail welding line:

- brushing machine for contact surfaces C3-03 with a filter and ventilation facility;
- rail cutting machine;
- rail drilling machine PCC-01;
- rail welding machine MCP-63.01A;
- hot joints straightening facility УПС-02;
- special compact press ПМС-320;
- rough grinding station ПГШ-01;
- pulling unit УТ-02;
- high frequency heating unit УИИ;
- installation of the welded joint air cooling - 5ЯТ.431.007;
- installation of the welded joint water cooling - 5ЯТ.431.006;
- cold straightening unit УПСХ-01;
- final grinding station ПЧШ-01;
- modular pulling transporter ТТ-02 (ТТ-03);
- multichannel defectoscope МИГ-УКС;
- portable defectoscope;
- transporter distributor of continuously welded rails ТРП-01;
- roller transfer sections СУРТ;
- manual grinding machine;
- electric hoist;
- platform cart with lifting mechanism;
- mobile hydraulic crane;
- electric loader.

Recovery line of reusable old rails:

- rail straightening press;
- rail turner;
- ultrasonic defectoscope;
- rail cutting machine;
- rail milling machine.

Storage area of the rail welding plant



The storage area of the rail welding plant is designed for storage of the rails after offloading them from the supplier's transport and for subsequent uninterrupted delivery to the technological welding lines.

The storehouse is a sheltered room made of profiled sheet with through passages. The rails are unloaded by remote controlled electric hoist with special grippers to the

horizontal landings in stacks.

At the request of customer the storage area can be equipped with electric hoist of different capacity and gripping mechanisms of various types.

Depending on productive capacity of the rail welding plant, the storage area can contain a monthly demand of rails or more.

TECHNICAL DATA		
CHARACTERISTIC		VALUE
Dimensions of the landing, mm	length	35 140
	width	29 440
	height	176
Max. quantity of the rails stored in the area, pcs		2 000
Max. mass of stored rails, t		3 600
Mass, kg		8 500

Universal roller transfer section CYPT



The universal roller transfer section CYPT is designed for transportation of rails along the technological line.

- A - CYPT-01 with a drive without rollers insulation (6ЯТ.321.007);
- B - CYPT-01 with a drive and insulated rollers (6ЯТ.321.007-01);
- C - CYPT-01 without drive, 4 000 mm long (6ЯТ.321.007-02);
- D - CYPT-01 without drive, 3 500 mm long (6ЯТ.321.010);
- E - CYPT-Robel without drive, 2 900 mm long (6ЯТ.321.011);
- F - CYPT-УИИ without drive for installation of УИИ 001-100 / РТ-С (6ЯТ.321.008);
- G - CYPT-У3К without drive for ultrasonic control system installation (6ЯТ.321.009);
- H - CYPT-ВДО without drive for installation the system of water cooling (6ЯТ.321.012)

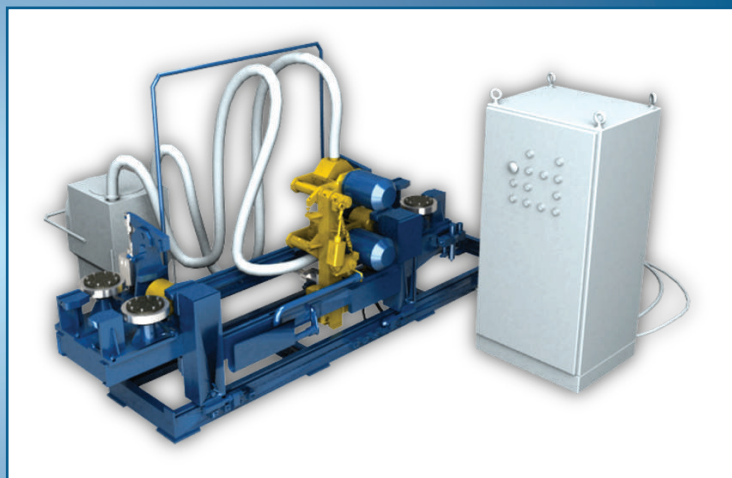
Sections are equipped with power and control electric equipment which is connected to the united linear circuit with an output to the control desk at each station. The sections are interchangeable, easy mountable and adapted to quickly change the driving force at each section, in case of mounting of additional equipment or after modernization of the technological line.

Sections allow passing through insulated rails joint with combined metal composite fish plates.

TECHNICAL DATA

CHARACTERISTIC	VALUE								
	A	B	C	D	E	F	G	H	
Rated supply main voltage of 3-phase AC, V	380	380	-	-	-	380	380	380	
Supply main frequency, Hz	50	50	-	-	-	50	50	50	
Drive power, kW	1,5	1,5	-	-	-	-	0,4	-	
Max. speed of rails transporting, m/s	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	
Max. mass of transporting items, kg	300	300	300	300	300	300	300	300	
Distance between the transfer plane and the floor, mm	700	700	700	700	700	700	700	700	
Rated power of frequency inverter, kW	-	-	-	-	-	75	-	-	
Pressure of the cooling water at input, MPa	-	-	-	-	-	0,2-0,3	-	-	
Operating pressure in air supplying system, MPa	-	-	-	-	-	0,5-0,8	0,63	-	
Dimensions, mm	length	4 000	4 000	4 000	3 500	2 900	2 950	3 320	4 000
	width	765	765	765	608	608	1 417	850	608
	height	796	796	796	796	796	2 200	1 600	1 170
Mass, kg	565	570	513	398	373	665	500	530	

Brushing machine for rail contact surfaces C3-03



The brushing machine for rail contact surfaces C3-03 is designed for simultaneous brushing of ends of two connected rails to ensure reliable electric contact before welding.

The machine consists of brushing unit, control cabinet, filter and ventilation unit. The condition of the treated contact surface meets contemporary requirements for

FBW. It permits to achieve optimal electrical parameters of the heat balance of flashing ensuring welded joint quality.

The machine can be installed in the technological line and be operated together with the rail welding machine or separately.

TECHNICAL DATA

CHARACTERISTIC		VALUE
Supply main voltage of 3-phase AC, V		380
Supply main frequency, Hz		50
Time of joint treatment, min., not more		2
Max. length of brushed surfaces, mm		700
Rated power at duty cycle=22%, kW		8,1
Additional stroke (manual moving), mm		1 000
Dimensions, mm (length x width x height)	brushing unit	3 063 x 940 x 1 042
	control cabinet	757 x 410 x 1 533
	filter and ventilation unit	970 x 650 x 1 050
Mass, kg	brushing unit	940
	control cabinet	82
	filter and ventilation unit	90

Rail drilling machine PCC-01

The single-spindle machine PCC-01 with digital program control is designed for drilling holes in the rails R65 in stationary plant conditions.

The machine construction allows chamfering.

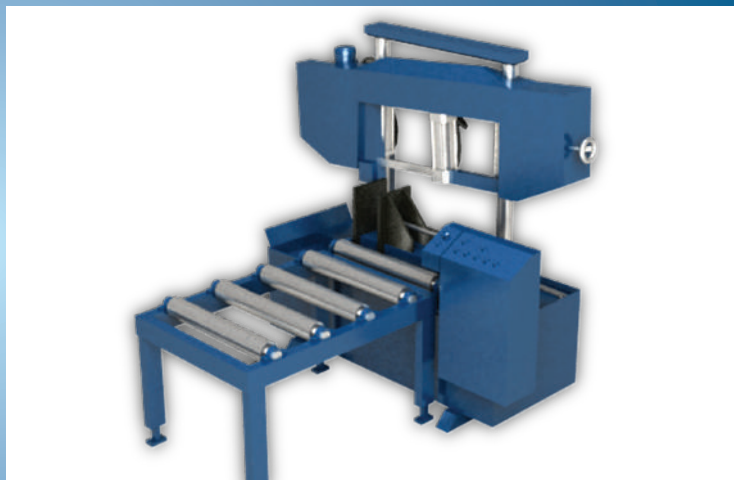
The machine is installed in automatic production lines

for heat treated rails at rail welding plants, as well as in metallurgical facilities manufacturing plants.

The machine PCC-01 is used in moderately-cold climate conditions, location category 4 as per GOST 15150-69.

TECHNICAL DATA		
CHARACTERISTIC		VALUE
Rated supply main voltage of 3-phase AC, V		380
Supply main frequency, Hz		50
Drill diameter, mm		36
Drill rotary speed, rpm		1 024
Drill feeding speed, mm/s	at instrument supply	20 - 30
	at drilling	0,7 - 1,2
Chamfer rotation speed, rpm		750
Chamfer feeding speed, mm/s		20 - 30
Lubricating-cooling fluid fed in cutting area, l/min		4
Rated pressure in hydraulic system, bar		140
Dimensions, mm (length x width x height), not more	drilling unit	1 728 x 1 311 x 1 292
	hydraulic drive station	1 141 x 678 x 1 064
	control panel	600 x 500 x 1 055
Mass, kg	drilling unit	1 116
	hydraulic drive station	326
	control panel	200

Rail cutting machine



The rail cutting machine is designed for:

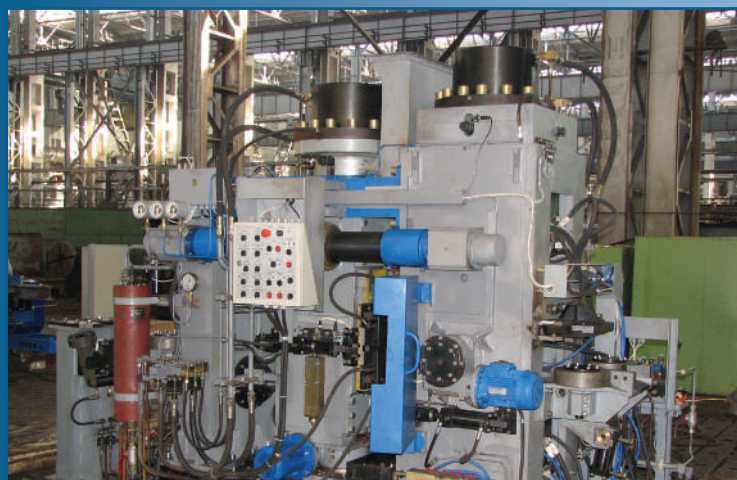
- cutting the rails to the required length;
- cutting test samples of the rails to prepare testing of the welded joints;
- cutting out faulty joints found during checking rails

welded joints by defectoscope МИГ-УКС.

The sawing frame of the machine is placed on two pillars, which considerably improves machine rigidity and precision of cutting.

TECHNICAL DATA		
CHARACTERISTIC		VALUE
Main electric motor, kW		1,1 / 1,5
Hydraulic oil pump, kW		0,37
Cooling system pump, kW		0,09
Control-circuit voltage, DC, V		24
Max. diameter of round bar, at sawing angle 45°, mm		255
Max. diameter of square bar, at sawing angle 45°, mm		255 x 305
Max. diameter of round bar, at sawing angle 90°, mm		305
Max. diameter of square bar, at sawing angle 90°, mm		360 x 305
Saw dimensions, mm		3 660 x 27 x 0,9 (3 660 x 25 x 0,9)
Saw speed, m/min		20 - 45 - 70 или 20 - 110
Dimensions, mm	length	1 800
	width	1 135
	height	11 570
Mass, kg		780

FBW machine of rails MCP-63.01A



The welding machine of rails MCP-63.01A is designed for FBW of rails by continuous or pulsating flashing in stationary plant conditions. The machine provides rail alignment before welding according to the rail axis and to the height of the rail head, welds rails according to the preset program, removes weld flash around the entire contour of the joint after welding.

The control system of the machine is based on an industrial computer.

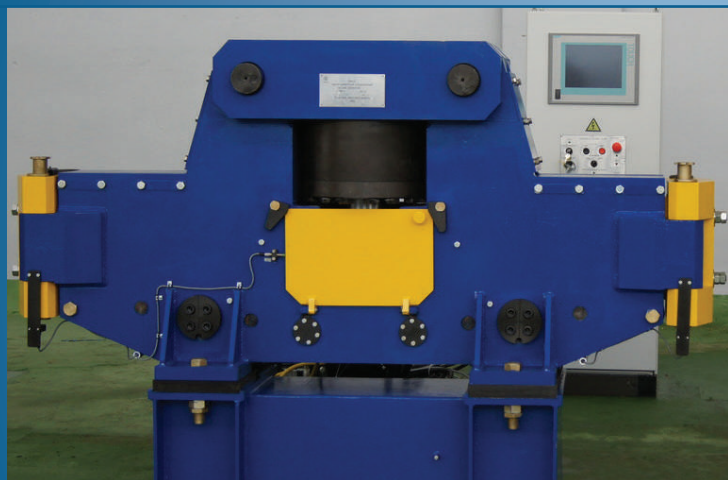
The system provides setting and checking parameters of the welding process. It provides the operator with the current information about technological welding procedure, records this information and issues a report (passport) on every welded joint.

The machine is used in moderately-cold climate conditions, location category 4 as per GOST 15150-69.

TECHNICAL DATA

CHARACTERISTIC	VALUE
Supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Max. power at short circuit, kVA	350
Welding transformers power at nominal stage at duty cycle=50%, kVA	80
Adjustment stages number	2
Secondary voltage control limits, V	7,92 - 8,84
Rated upsetting force at pressure 15,7 MPa (157 kgf/cm ²), daN (kgf), not less	63 000
Max. upsetting force at pressure 15,7 MPa (157 kgf/cm ²), daN (kgf)	84 000
Rated gripping force at pressure 18,8 MPa (188 kgf/cm ²), daN (kgf), not less	151 000
Movable frame stroke, mm, not less	100
Clampings stroke, mm, not less	60
Max. upsetting speed, mm/s, not less	30
Control limits of welding speed, mm/s	0,2 - 5,0
Max. cross section area of welded article, mm ²	10 000
Short term performance of rail welding, joint/h, not less	15
Interval of horizontal and vertical correction, mm	±10
Cooling water consumption at pressure 0,15 (1,5 kgf/cm ²), l/min	30

Special compact press ПМС-320



The special compact press ПМС-320 is designed for quality control of rail welded joints. It applies sampling method by means of testing check samples for static transversal bending.

The control system of the press is based on an industrial computer. It allows recording and storing testing procedure

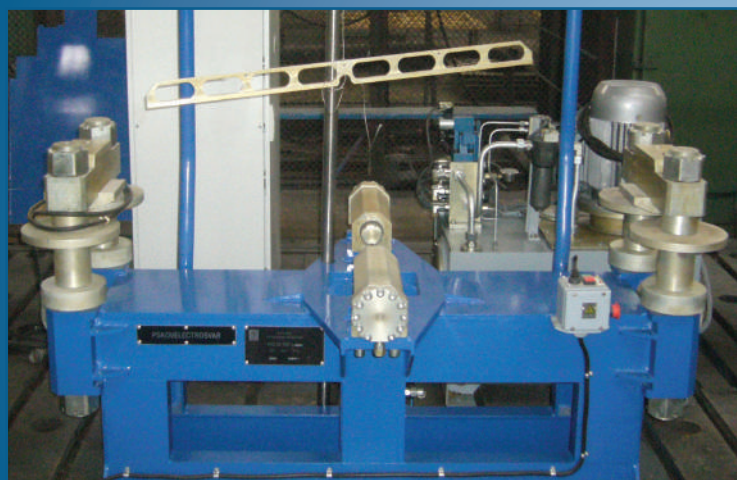
information, registering every fracture, displaying load curve of the process and controlling the process in real time mode.

Compact dimensions and mass of the press allow using it both in stationary plant conditions and as a part of rail-dound welding machinery (ПРСМ).

TECHNICAL DATA

CHARACTERISTIC		VALUE
Rated supply main voltage of 3-phase AC, V		380
Rated voltage of diesel electric station, V		400
Supply main frequency, Hz		50
Max. force, t, not less		320
Max. bending, mm		60
Tested items length, mm		1 100 - 1 800
Hydraulic system operating pressure, MPa		40
Dimensions, mm (length x width x height)	press	2 200 x 560 x 1 541
	hydraulic station	673 x 434 x 725
	control cabinet	622 x 450 x 1 750
Mass, kg	press	3 260
	hydraulic station	105
	control cabinet	130

Hot joints straightening unit УПС-02



The hot joints straightening unit УПС-02 is designed for straightening hot welded joint to meet the requirements of the rolling surface and the rail head geometry. The unit straightens the rail in horizontal and vertical planes along standard length 1 700 mm. The straightness of the welded joint is checked on the working side of the rail head. The frame has two support rollers on which the welded rail moves, two hydraulic cylinders for straightening in the

horizontal plane and one hydraulic cylinder for straightening in the vertical plane. The pullers have rollers and plugs which limit the movement of the rail during straightening. Control of the movement of the hydraulic cylinders lugs is accomplished by the joystick in four directions.

The unit allows passing through insulating rails joint with combined metal-composite fishplates.

TECHNICAL DATA		
CHARACTERISTIC		VALUE
Rated supply main voltage of 3-phase AC, V		380
Supply main frequency, Hz		50
Operating pressure in hydraulic system, MPa (kgf/cm)		16 (160)
Hydraulic cylinders driving force for horizontal straightening, kN (kgf)		80 (8 000)
Hydraulic cylinders rods stroke for horizontal straightening, mm		170
Hydraulic cylinder force of vertical straightening, kN (kgf)		196 (19 600)
Hydraulic cylinder rod stroke for vertical straightening, mm		80
Straightening speed, mm/s, not less		30
Dimensions, mm (length x width x height)	straightening unit	1 740 × 990 × 985
	hydraulic drive station	850 × 610 × 1 300
Mass, kg	straightening unit	780
	hydraulic drive station	480

Rough grinding station ПГШ-01



The rough grinding station ПГШ-01 is designed for abrasive treatment of the joint around the whole perimeter at the same level with the main profile along the rail. The rough grinding station is a cabin, equipped with local input-

exhaust ventilation. The set of the station includes grinding machines for lateral sides, foot and head of the rail.

The station allows passing through insulated rails joint with combined metal-composite fishplates.

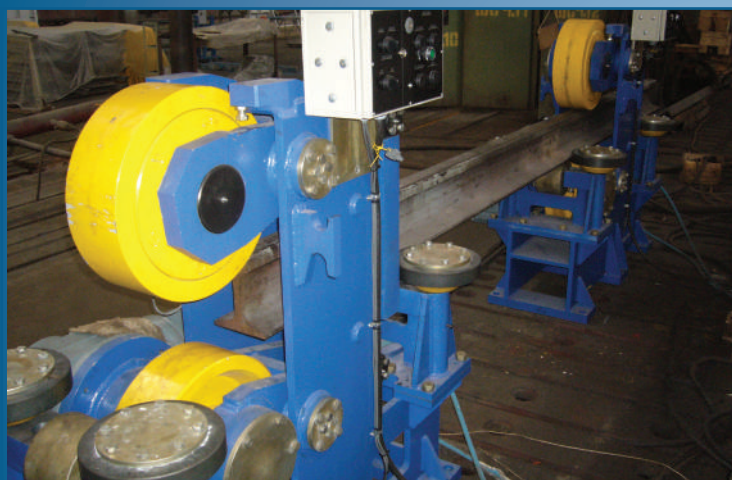
TECHNICAL DATA

CHARACTERISTIC	VALUE
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Available power, kW	12
Dimensions, mm (length x width x height)	3 600 x 3 000 x 3 520

GRINDING MACHINES

CHARACTERISTIC	VALUE
Type of grinding machine	electrical
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Electric motor power, kW	3
Grinding wheel rotation, rpm	2 850
Grinding wheel dimensions, mm	Ø 300 x Ø 76 x 32
Grinding wheel circumferential speed, m/s	40

Pulling unit YT-02



The pulling unit YT-02 is designed for transportation of continuously welded rails along the technological line of the rail welding plant to the pulling transporter. When the unit operates, the rolling sections drives are switched off ensuring electricity saving. The unit has a variable-

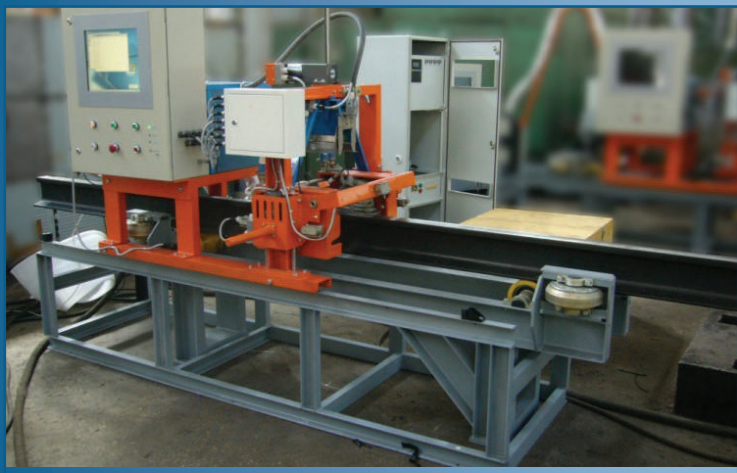
frequency drive providing smooth changing of continuously welded rail traverse speed.

The unit allows passing through insulated rails joint with combined metal-composite fishplates.

TECHNICAL DATA

CHARACTERISTIC	VALUE
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Consumption power, kW, not more	6,62
Traction force, kN, not less	10,4
Rollers gripping force, kN, not less	70
Continuously welded rail transporting speed at set mode, m/s	0,5
Max. acceleration (deceleration) of continuously welded rail transporting, m/s ² , not more	0,02

High frequency inductive heating unit УИИ



The high frequency inductive heating unit УИИ is designed for differential heat treatment of rail welded joint. The control unit of the technological process ensures a complete automation of the process with min. participation of the operator and realizes the following functions:

- checking of the unit in two modes: manual and automatic;
- set and control the parameters of heat treatment: temperature of heating, time of heating, frequency inverter power, time of tempering, air pressure in the tempering unit;
- control of the unit equipment technical condition according to the sensors signals and end switches;
- creating, accumulating and storing of passport dates (information about the process of heat treatment) for every welded joint with possibility for their printing;
- creating a shift report on the results of the unit operation during shift with a statement of each welded joint (fit/unfit) with an opportunity to print the dates after the shift.

TECHNICAL DATA	
CHARACTERISTIC	VALUE
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Max. rated power, kVA	100
Relative supply main regulation, %	10
Conversion frequency, kHz	от 7 до 16
Convertor cooling	forced air
Matching transformer cooling	forced air
Inductor cooling	water
Availability of overload protection	+
Availability of power loss protection	+
Weight-power ratio of the converter, kg/kVA	2
Cooling water capacity, m ³ /h, not more	2,0
Heating temperature, °C	from 850 up to 900
Temperature range, °C	from 200 up to 1200
Time of joint heating, s, not more	240
Interval between the end of heating and beginning of cooling, s, not more	15
Time for joint cooling, s, not less	180
Operating pressure in the air supply system, MPa, not less	0,6
Air consumption, m ³ /min, not less	6,4

Air and water cooling section of the welded joint

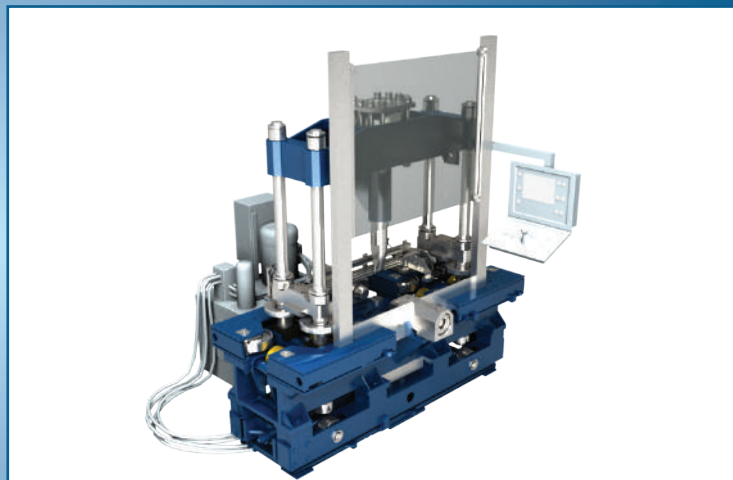


The air and water cooling section of the welded joint is designed for cooling the welded joint of the transported continuously welded rail along the technological line of the rail welding plant. When the continuously welded rail is delivered and stopped at the section, the welded joint area is watered for cooling. When the rail transferred further along the technological line, water supply to atomizer

is switched off and the frames for blowing and drying of continuously welded rail wet surfaces switch on. The frames are installed at the input and output of atomizer for cooling in the cases of reverse movement of the continuously welded rail. Watering and blowing are carried out according to the set time intervals.

TECHNICAL DATA		
CHARACTERISTIC		VALUE
Bearing rollers number		2
Bearing roller diameter, mm		160
Watering site length, mm		960
Input power, kW		0,5
Supply main voltage, V		220
Dimensions, mm	length	4 088
	width	620
	height	1 084
Mass, kg		530

Cold joints straightening unit УПСХ-01



The cold joints straightening unit УПСХ-01 is designed for straightening cold rail joints to meet the required geometry of the rolling surface and the rail head. The unit straightens the rail in horizontal and vertical planes on a base length of 1 300 mm and checking the rail bending on the length of 750 mm by laser sensors.

Control system of the unit is based on an industrial computer. It allows recording and storing the dates of straightening process of the welded joint.

The unit allows passing through insulating rails joint with combined metal-composite fishplates.

TECHNICAL DATA

CHARACTERISTIC		VALUE
Rated supply main voltage of 3-phase AC, V		380
Supply main frequency, Hz		50
Straightening mode		manual, semiautomatic
Straightening time, min, not more		5
Measuring system precision, mm/m		0,1
Distance between the pillars, mm		1 300
Max. bending moment, kgm, not less	horizontal straightening	15 460
	vertical straightening	53 485
Operating pressure in hydraulic system, MPa		31
Rated pressure in pneumatic system, MPa		0,617
Hydraulic cylinders force, kN (kgf)	horizontal straightening	477,21 (47 721)
	vertical straightening	1 645,9 (164 590)
Hydraulic cylinders rods stroke, mm	horizontal straightening	160
	lower rod of vertical straightening	45
	upper rod of vertical straightening	115
	transporting the straightening nit	400
Dimensions, mm (length x width x height)	straightening unit	2 030 x 1 110 x 2 090
	hydraulic drive station	1 370 x 1 070 x 1 244
	control cabinet	703 x 400 x 1 162
Mass, kg	straightening unit	3 050
	hydraulic drive station	790
	control cabinet	110

Final grinding station ПЧШ-01



The rail final grinding station ПЧШ-01 is designed for final profile grinding of the welded joint of the rail head. The station is a cabin equipped with local input-exhaust ventilation. The set of station include grinding machine for

final grinding of the rail head profile.

The station allows passing through insulating rails joint with combined metal-composite fishplates.

TECHNICAL DATA

CHARACTERISTIC	VALUE
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Rated power, kW	4
Dimensions, mm (length x width x height)	3 600 x 3 000 x 3 520
Mass, kg	3 200

GRINDING MACHINE

CHARACTERISTIC	VALUE
Type of grinding machine	electrical
Rated supply main voltage of 3-phase AC, V	380
Supply main frequency, Hz	50
Electrical motor power, kW	3
Distance between the guiding rollers, mm	855 - 1 000
Distance between supporting rollers, mm	795 - 880
Dimensions of the grinding wheel, mm	Ø 150 x 72
Mass, kg	39

Modular pulling transporter TT



The modular pulling transporter TT is designed for operation as a part of technological line of the rail welding plant for transporting continuously welded rails.

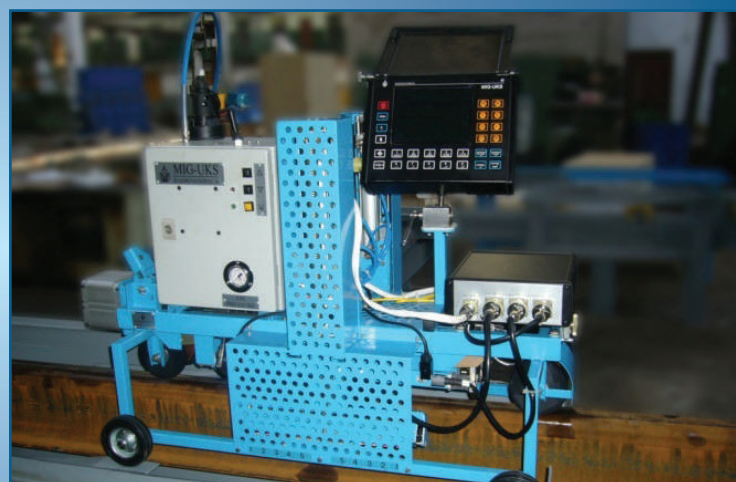
The control system of the transporter is based on an industrial computer. The speed of continuously welded rails movement and traction force are set by variable frequency

drive. Depending on the length of the continuously welded rail, the pulling transporter can be made in two versions: TT-02, which consists of four modules and TT-03, which consists of 5 modules.

The transporter allows passing through insulating rails joint with combined metal-composite fishplates.

TECHNICAL DATA		
CHARACTERISTIC	VALUE	
	TT-02	TT-03
Rated supply main voltage of 3-phase AC, V	380	380
Supply main frequency, Hz	50	50
Traction force, kg	6 820	8 280
Pulling rollers number	8	10
Max. speed of the continuously welded rail transporting, m/s	0,5	0,5
Rated power, kW	37,92	47,12
Mode of changing the speed of continuously welded rail transporting	frequency regulation	frequency regulation
Dimensions, mm (without hydraulic station and control cabinet)	3 500 x 900 x 1 750	4 500 x 900 x 1 750
Mass, kg	4 500	5 500

Ultrasonic defectoscope МИГ-УКС



Ultrasonic defectoscope МИГ-УКС is designed for testing the whole rail section (including blades of the rail foot) by means of 86 check channels. The ultrasonic testing system of joint allows detecting defects of various forms and orientations.

The detecting system includes five blocks of resonators, one of which is situated on the roll surface of the rail head, two on the lateral surfaces of the head and two on the upper surfaces of the blades of the rail foot. Before the

control of the welded joint, acoustic contact under each sensor is checked automatically.

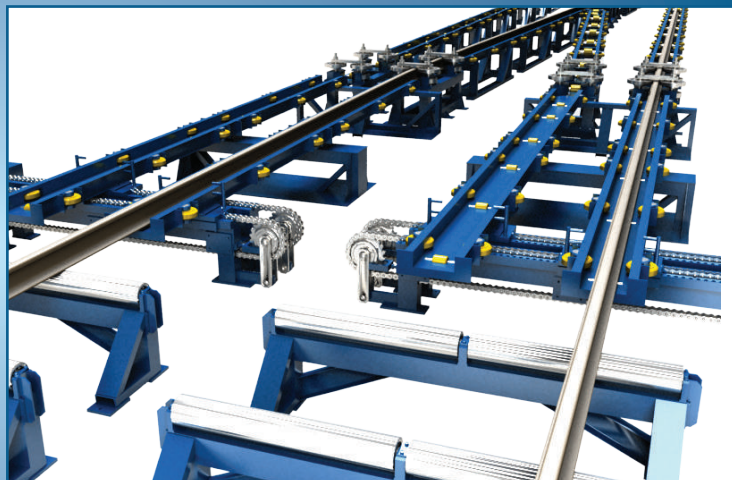
The check results of each joint are stored in the defectoscope memory as protocols. The display program of the defectoscope МИГ-УКС allows monitoring and print the control protocols which contain detailed defectoscopic and service information through all the channels, as well as creating an electronic report (passport) of the continuously welded rail.

TYPE		Max. permissible error limits of measuring the coordinates of the reflectors (defectors), mm, not more:	
resonator	manual ПЭП	depth, H	Distance between defectoscope and defect projection on the scanning surface, L
РП-РС	П112-2,5	$\pm(3+0,01H\phi)$	—
РП-45/45	П121-2,5-45	$\pm(2+0,05H\phi)$	$\pm(2+0,05L\phi)$
—	П121-2,5-50	$\pm(2+0,05H\phi)$	$\pm(2+0,05L\phi)$
—	П121-2,5-58	$\pm(2+0,1H\phi)$	$\pm(2+0,1L\phi)$
—	П121-2,5-65	$\pm(2+0,15H\phi)$	$\pm(2+0,2L\phi)$
РП-70	П121-2,5-70	$\pm(2+0,15H\phi)$	$\pm(2+0,2L\phi)$

H_{ϕ} – real value of the reflector depth;

L_{ϕ} – real value of the distance between the defectoscope and the reflector projection on the scanning surface.

Transporter-distributor of continuously welded rail ТРП-01



The transporter-distributor of continuously welded rail ТРП-01 is designed for redistribution of the continuously welded rails at loading on the rail-carrying train in the conditions of multiple-flow production. The transfer of the continuously welded rail from one flow to another is carried

out by screw mechanisms of the switches, by movable guides and by carriages with chain drive.

The transporter-distributor allow passing through insulating joint of the rails with combined metal-composite fishplates.

TECHNICAL DATA

CHARACTERISTIC	VALUE
Rail transportation height, mm	700
Distance between flows, mm	4 200
Distance from the start of the transporter-distributor to the continuously welded rail train, m	59
Rail bend angle by transfer to another flow, grade, not more	4°15'
Mass, kg	40 500



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