April 15, 2019





# Drawing: P19.D6.C1.0

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## 1.0 OVERVIEW

The Wheelset Press has the scope to mount:

- wheels;
- brake discs;
- gears;

and demount:

- wheels;
- brake discs;
- gears;

with maximum load of 3000 kN (300 tonnes).



Similar equipment

The machine mainly consists of two hydraulic rams mounted in reaction frame and a motorized resistance head, fitting device, assembling system, hydraulic unit and electric control unit. The equipment shall be a double-head press-fit equipment. The structure shall have adequate rigidity and strength, good shock resistance and absorbing capacity to keep smooth movement, so that it can ensure the press-fit accuracy.

The machine, when the clearance between the different elements to be fitted allow doing it, can mount the components (2 wheel discs and up to 3 brake discs) with a single wheelset positioning.



## 2.0 TECHNICAL DATA

The press comprises:

- horizontal structure with 2 end frames complete with two hydraulic cylinders;
- motorized resistance head;
- manual carriage to loading/unloading the wheelset;
- machine floor covering;
- hydraulic system;
- electrical-electronic equipment for control of the press functions;
- assembling system;
- Special tools for mounting and dismounting two kinds of wheelsets, 1 motor and 1 trailer;
- Spare parts.

The main technical data of the press:

Main Cylinders max force	3000 kN
Main Cylinders stroke	900 mm
Main Cylinders approach speed	0-25 mm/s
Main Cylinders return speed	0-25 mm/s
Main Cylinders mounting speed	0,5 – 5 mm/s
Hydraulic power unit max operating pressure	Approx. 315 bar
Electrical voltage of motors (three-phase)	415V - 50Hz
Auxiliary electrical voltage	24 Vdc
Position accuracy of the mounted elements	± 0.2 mm
Total installed power	Approx. 30 kW
The noise level during working shall be.	less than 80 db

## Main specifications of axles and wheels:

Wheelset weight, Max	3000 kg
Track gauge min/Max	1000 ÷ 1676 mm
Max. external diameter of component to be mounted, min/Max	400 ÷ 1250 mm
Wheel seats diameter, min/Max	150 ÷ 240 mm



Axle length, min/Max	1500 ÷ 2600 mm
Max radius of gearbox	630 mm

## Ambient conditions:

Installation room	Interior industrial site
Ambient temperature (inside the depot)	Min +5 °C max +40°C
Humidity	max 90%

## **3. OMACHINE DESIGN**

## **3.1Main Structure**

The structure consists mainly of:

- Base frame;
- End frames housing the hydraulic cylinders;
- Two cross-beams;
- Beam to carry the axle assembling electronic positioning system.

The base frame consists of two large steel section bars, joined together by a series of welded cross-beams to form a rigid structure, suitable for imposed loads.

The undersides of the section bars have holes for anchoring and levelling the press on its foundation.

The end frames, which house the cylinders, consist of two thick steel plate sides, welded to the reinforcing cross-plates and to two sleeves housing the cross-beams.

The two cross-beams are specially machined along most of their length and are designed to withstand the assembly/disassembly forces on the resistance head due to the force applied by the main cylinder. The two cross-beams are equidistant from the working axis and positioned so as to allow a crane to be used to load/unload the wheelsets.

In the rear is fixed the frame on which is mounted the assembling system.



## 3.2 Hydraulic Cylinders

There are two hydraulic cylinders mounted on the end frames of the press. The cylinder rod is super finished, surface hardened, hard chromed and torsion guarded.

Each cylinder will have an advanced centring device, free to rotate (in order to be able to carry out the radial and side run out test), able to allocate and support the axle on its centre holes.

During the working operation the axle vertical centre line and the hydraulic cylinder centre line will remain stable.

## 3.3 Floor covering

Floor coverings made from anti-slip plates will be supplied and fitted as required to cover all floor openings.

#### 3.4 Motorized Resistance Head

The resistance head consists of a welded steel base frame which runs on steel wheels on guides in the base frame. The travel motion is by electric drive units.

The main structure of the reaction head houses 2 reaction plates, into which the relevant tooling for each wheelset type is mounted. The reaction plates are extended/ retracted automatically by means of hydraulic cylinders.



## 3.5 TOOLS

The Wheels press will be equipped with the tools able to work 2 kinds of wheelsets, 1 motor and 1 trailer.



## 3.6 HYDRAULIC SYSTEM

The system comprises:

- Hydraulic power unit;
- Hydraulic cylinders;
- Connecting pipes.

The oil required to fill the hydraulic power unit is not included in the supply.

## 3.6.1 Hydraulic power unit

The power unit comprises:

- Tank;
- Pump with appropriate capacity;
- Proportional valve for regulation of working pressure;
- Proportional valve for adjustment of operating speed (main cylinders);
- Solenoid valves to control the various cylinders;
- High-efficiency air filter;
- Oil temperature thermostat;
- Tank oil level indicator;
- Maximum pressure valve to prevent hydraulic overloading.

The power unit will also feature a heat exchanger and an electric fan for oil cooling. Oil chiller available upon request and subject to additional quotation.



Similar Hydraulic power unit



## 3.6.2 Hydraulic cylinders

The press is equipped with the following cylinders:

- no. 2 main cylinders;
- axle centring cylinders built into the centre;
- cylinders, to move the reaction plates.

## 3.6.3 Pipework Connections

Pipework connections between the hydraulic unit and the press and on the press itself are made from hard steel pipework where possible, and reinforced hoses where necessary due to movement requirements.



## 3.7 ELECTRIC -ELECTRONIC EQUIPMENT

The equipment for electrical supply and for press control and monitoring are contained in a painted steel electrical panel, with IP54 protection, mounted on a side of the press.

A pictogram or a nameplate in English identifies each control device.

The cables are rated for 600/1000V, are of flame-retardant type and are fitted into suitable trenches, conduit, cable-trace or protective sheaths.



## 3.7.1 Electrical cabinet

The main panel control consists of:

- three-pole master magneto-thermic circuit-breaker;
- power equipment for the motors supply;
- device controlling the series of emergency switches;
- PLC Siemens controller with a suitable number of input and output modules;
- UPS.

#### **3.7.2** Control console

In the control console will be installed the computer and the buttons to control and monitoring the press working.

The press will be supplied with an A4 size printer.

In the computer will be installed the interface software working on Windows® base (English version).

The industrial PC, ASEM make, will include:

- LCD TFT da 21,5" W 16:9 1920x1080 (FHD), 16M colours
- <u>Touch-Screen Multitouch</u>
- Intel<sup>®</sup> CoreTM i3-5010U 2,1Ghz, 2 cores 4 threads 3MB smart cache
- <u>4GB RAM</u>
- Front panel TrueFlat in alluminium and glass
- Fanless
- <u>video output DVI-I for additional external monitor</u>
- <u>UBIQUITY PRO Win32 runtime</u>
- Power supply 24V DC isolated
- <u>SSD 256GB</u>
- Licence Microsoft WINDOWS 10 IoT Enterprise 2016 LTSB Value 64bit MUI-A2

A PLC Siemens controller Series 1500, will assure the Wheel Press control.

The software will supply a graphical description of the machine working (in English language).

The pictures, displayed on the screen, will conduct the operator in simple way during the working phases.

The software will get the signal from the different transducers and valves on the machine and it will show them on the screen.

The parameter will be surveyed and shown on appropriate pictures on the screen. It will be possible to print out the data in a report.

Pre-installed software and Ethernet card for remote assistance will be part of the supply.



All data will be automatically stored in the computer and it will be possible to fetch them again later.

The data saved during the tests can be stored on external devices such as USB flash drives so that they can be later revised with software such as Excel<sup>®</sup>.

For each types of wheelset can be inserted the related parameters, so that they can be stored and used in future operation for the same type of wheelset.

								AXLE TYPE
WHEELSET DATA							123	
DESCHIPTION								WORK ORDER
classelm.							322132	
DRAWING #								AXLE NUMBER
123123							1234	
NOTE								AXLE LENGTH
33322								0,00
LIFTING JACK //1 LIFT	INCLUSION	1000	MIN	E E	6	L	C	OPERATOR
-12-		3-	-4-	-5-	- 6-	-7-	-8	USER_0
0.0 -12-	-	3-	-1-	-5-	- 6-	-7-		USER_0
-12-	-	3 -	-4-	- 5 -	-8-	-7-		USER_0
-12-	-	3 -	- 4 -	- 5 -	- 6-	-7-		USER_0
-12-	TER İnni	3 - 0.00 0	- 4 -	- 5 -	- 6-	-7-		USH_0
-12-	WETER [mm]	3 - 0.00 0	-4- 0.00 0.00 0.00 0.00 0.00 0.00 0.00	- 5 - 0,00 0,00 0,00 0,00	- 6-	-7-		USER_0
-12-	EDWMETER jmmj	3 - 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	- 4 - 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,	- 5 - 0,00 0.00 0,00 0,00 0,00	- 6-	-7-	- #	USER_0
-12-	VLE DAMETER [mm]	3 - 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	- 4 - 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,	- 5 - 0,00 0.00 0,00 0,00 0,00 0,00	- 6-	-7-	- 8	USER_0
-12-	ANLE DAMETER (mm)	3 - 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	- 4 - 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,	- 5 - 0,00 0,00 0,00 0,00 0,00 0,00 0,00	- 6-	-7-	- 8	USER_0
-12-	ANLE DWMETER (mm)	3 - 0.00 0	-4- 0,00 (EE) 0,00 0,00 0,00 0,00 0,00 0,00 0,00 U2U1 0,00 U2U1 0,00 U2U1	- 5 - 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	- 6-	-7-	- 8	USER_0

The machine can be operated in both automatic and manual mode. The latter, in particular, is used during the maintenance procedures.

In case of damage or fault will be shown appropriate alarm picture on the screen.

Scheduled checks and maintenance will be provided.

++ V201					
	SCHEDULED CHECKS / MAINTENANCES WORKING TIME Oh 0'				
INTERVAL 120 h	PESCENE JUEN power pack oil level check Filters check RESET				
OPERATOR + USER_0 - DATA UPDATE					



## 3.8 Assembling System

The assembling system uses a laser sensor to determine the position of the components on the axle and so allow automatic assembly / proving to take place. Measurement data is included in the final report.

Mounting operation shall consider the bearing shoulder as reference point.

The operator interface provides a real time display of the operation, allowing the operator to directly monitor the dynamic process. The graphs shown on the screen, dynamically in real time, are included in the report and can be printed if required.

## 3.9 Manual Loading/Unloading Trolley

The carriage to support and transfer the wheelset from the pre-fitting area to the center of the wheelset press and from the center to the offloading area will be composed of:

$\triangleright$	
	carriage structure;
A	protection cover;
A	wheels in steel;
$\succ$	screw jacks for vertical movement;
$\blacktriangleright$	axle adjustment in Y direction (by linear guides or roller);

## Technical data:

capacity	3000 kg

The carriage will have a manual push travel.

Axle positioning on the trolley (for fitting preparation) or removal of the fitted axle from the trolley has to be carried out by means of the crane.





#### 3.10 Backpressure Test

The machine is equipped with a software able to verify the mounting operation. The test has to be carried out after mounting and requires the cylinder to press the component for 30 sec (at least) in order to verify if the diagram force/time remain constant for all the time.

In case the diagram does not achieve this result, this means that the components has not been properly fitted and has to be removed.

The machine software allow carrying out also the following test: Force versus Displacement.

## 3.11 Wheelset Rotation Device (OPTION)

The wheelset rotation device is an electrically driven roller that allows the wheelset to be rotated on its centres after the assembly or proving test has been completed. Rotating the wheel allows the assembling system measurement equipment to check the radial run out on the wheel tread and axial run out on the back of the wheel flange.

## WHEEL-SET PRESS MDT300/2





## 3.12 Calibration Equipment

The calibration equipment comprises a dummy wheelset with load cell and tooling. It is used in an automatic calibration cycle to correct the force transducers and measuring equipment on the wheel press.

The machine is equipped with a software able to guide the operator, step by step, through the calibrating procedure.







## 3.13 Lifting device for gearbox

The Wheel press will be equipped with 1 single arm-lifting device, a manual jib crane, for lifting all kinds of gearbox. During working the single arm lifting device is moving together with gearbox.





## 3.14 High pressure hydraulic pump for the wheel removing process (OPTION)

This pump, thanks to the oil pressure (max.3000 bar), is able to reduce the pressure to be applied during the disassembly of the wheel. Since the pump works accordingly to the air pressure provided, 7 bar air pressure must be available at the machine installation place to reach nominal pressure of 3000 bar. The pump will be offered with No 1 ¼" GAS nipple, No. 1 extension tube 400 mm L ¼" GAS, 4 m L oil hose and 5 m L air hose.

#### 3.15 Safety Devices

The press is fitted as standard with photoelectric barriers to protect the operator during the mounting/dismounting/proving operations.

Emergency stop buttons are provided and an acoustic warning signal.

All guarding / safety systems are fully in accordance with European safety regulations.



## 3.16 Data

The data that the operator will enter, using his own password (otherwise no action is allowed), are:

- operator name;
- axle type;
- axle serial no.;
- working pressure.



The data automatically put in by the software are:

- date and time;
- workshop name.
- max force ;
- resistance head position;
- graph indicating the mounting curve, referring to the force and the travelled length (start and end position of the mounting curve will be zero);
- backpressure test (diagram Force versus Time or Force versus Displacement);
- result of the components mounting position and wheel gauge;





## WHEEL-SET PRESS MDT300/2





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## 3.17 Painting

The structures to be painted will be sand blasted to Sa2 $\frac{1}{2}$  as required by SVENKS STANDARD SIS 0559 00-1967, with average final roughness of Ra12,5  $\mu$ m.

Components applied to the surfaces:

TWO-COMPONENT EPOXY-RESIN PRIMER WITH PHOSPHATE (thickness 40-50 nm)

TWO-COMPONENT EPOXY-RESIN COATING COMPOUND (thickness 40-50 nm)

Final coat minimum 80-100  $\mu m$ 

Standards BBM colours:

YELLOW RAL 1023 for moving parts

GREY RAL 7032 for fixed parts

Special painting colours can be requested by customer.

Commercial components, electrical panel RAL 7035 included, will retain their original colours.

Alcohol-based paint are used on surfaces machined by machine tool.

## 3.18 References to Regulations and Legislation

The press is engineered and constructed in accordance with the technical regulations and legislation in force in the European Community.

The press will be marked with CE certificate.

## 3.19 Technical Documentation

The technical documentation supplied with the press, written in English, includes (in two paper copies and 1 soft copy):

- use and maintenance manual;
- hydraulic system diagrams;
- electrical wiring diagrams;
- general assembly drawings;
- foundation drawings;
- spare parts list;

The press and its component certificates will be written in English.



## 4.0 CIVIL ENGINEERING WORK

Civil works are not included in the offer.

The machine, mounted on self-supporting frame, can be installed on a standard concrete flooring without needs of foundation.

BBM SpA will supply the drawings for the foundation required, including electrical and load specifications. The equipment supplied will include the tie-bolts for anchoring the machine and the levelling screws.

#### 5.0 INSTALLATION, TEST AND WARRANTY

#### 5.1 Installation

The offer includes the mechanical and electrical installation of the press at the Customer's final installation place.

## 5.2 Factory Acceptance Test (FAT)

After assembly a FAT will be carried out at BBM's premises, witnessed by Customer representative. The FAT date will be agreed 2 months in advance. Standard test wheelsets are used for the FAT, customer wheelsets can be used if necessary, but the shipping to and from BBM's premises is at the cost of the customer Testing work piece will be provided by the customer. The FAT test will be in accordance with a standard BBM FAT document previously, which will be submitted to the customer for approval and any necessary modifications made.

## 5.3 Acceptance of equipment after unpacking

After the equipment arrives at the Customer's plant, the Seller shall send specialists to the Customer's premises to open the packing boxes of the equipment and to carry out acceptance item-by-item together with the Customer's personnel, based on the packing list.

#### 5.4 Site Acceptance Test

After completion of installation, a Site Acceptance Test will be carried out. Materials supplied by the Customer. The SAT test will be in accordance with a standard BBM SAT document previously, which will be submitted to the customer for approval and any necessary modifications made.

Wheelsets required for the SAT to be made available by the customer as required by the agreed SAT documentation.

## 5.5 Staff training

After completing the Site Acceptance Test, training will be carried out for Customer's operators (4 persons for 5 days). Training comprises theoretical and practical aspects of using and maintaining the wheel press. The Customer will supply all materials (axles, wheels and gears) in time for training. A training certificate will be supplied.



## 6.0 WARRANTY

The warranty lasts for Twelve (12) months from the date of the final acceptance test of the press, and however not more than Sixteen (16) months from the delivery date of the press. It includes all the costs of onsite repair or replacement of faulty parts. The warranty does not cover damage due to incorrect use of the press or parts subject to normal wear.

## 7.0 SPARE PARTS LIST FOR TWO YEARS OPERATION

The following spare parts list will be supplied with the press:

No. 1	Light kit	Siemens
No. 1	RAM encoder	Lika
No. 1	SSI card	Siemens
No. 1	Pressure transducer	AEP
No. 2	Coil to valve	EDI System
No. 2	Electrodistributors	Bosch-Rexroth
No. 4	Oil filter	Hydac
No. 1	Air filter	Hydac
No. 1	Level indicator	MP