

**MEDIUM-FREQUENCY CRUCIBLE INDUCTION FURNACE PLANT
WITH FREQUENCY CONVERTER, MFTGe 5000/3000 kW/250 Hz**

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TECHNICAL DATA (CAST IRON 1,450°C)
General furnace plant data

Capacity	5,000 kg
Rated power input to the furnace	3,000 kW
Rated frequency with furnace contents fully molten down	250 Hz
Converter design	12 pulses
Inside crucible diameter	860 mm
Inside crucible depth	1,600 mm
Nominal wall thickness (insulation and ceramics)	120 mm
Ramming mix requirements per crucible	2,000 kg
Equivalent continuous sound pressure level	85 dB(A)

The equivalent average continuous sound pressure level of the furnace plant with closed hood is measured at the operating place on the furnace platform during one shift at a distance of 1 m and a height of 1.6 m from the edge of the tiltable furnace platform. Measurement according to DIN 45635-1, evaluation according to DIN 45641 (ambient noise is excluded).

Medium-frequency crucible induction furnace plant

Melting rate	
■	with maximum furnace power 5,850 kg/hr
■	with simultaneous melting and holding 5,450 kg/hr
Melting time	
■	with maximum furnace power 52 min
■	with simultaneous melting and holding 55 min
Specific energy requirements - supply end of the converter	
■	with maximum furnace power 525 kWh/t
■	with simultaneous melting and holding 530 kWh/t
Specific energy requirements - furnace end	
■	with maximum furnace power 505 kWh/t
■	with simultaneous melting and holding 510 kWh/t

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Holding power consumption with hood closed (1,450°C) 150 kWh/hr

The melting rate, specific energy requirements and melting time figures are based on fully heat-stored furnace without heel. They furthermore apply to the melting of clean, lumpy charge material (no alloying work) and take no account of operational idle periods.

The min. bulk density of charge material is 2 t/m³ related to cast iron. The charge composition may have an influence on the melting rate and the energy consumption.

The furnace plant is to be operated according to Otto Junker operating instructions.

Electrical supply (to be provided by customer)

Mains	20,000 V	three-phase	50 Hz
Auxiliary circuits	400 V	three-phase	50 Hz
Lamp voltage	230 V	a.c.	50 Hz

Transformer

Connected load of the three-phase rectifier transformer 3,525 kVA

Hydraulics

Tilting time for emptying	49 s
Quantity of oil	160 l
Motor rating	11 kW
Operating pressure of hydraulics	165 bar
Valve voltage	24 V

Cooling unit for 2 furnaces and 1 converter		
	furnace circuit	switch gear circuit
Cooling capacity (kW)	950	150
Δt (°C)	30	5
Water supply temperature (°C)	40	36
Water return temperature (°C)	70	41

Emergency water flow rate - furnace circuit 10 m³/hr

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Cooling agent (to be provided by customer as per OTTO JUNKER specifications)

- | | | |
|---|--------------------|-------------------------------------------------------|
| ■ | Furnace circuit | water
max. 25 °C/min. 15 °C |
| ■ | Switchgear circuit | water
max. 25 °C/min. 15 °C |
| ■ | Emergency water | max. 25 °C,
pressure min. 3 bar with water flowing |

The technical data are subject to a tolerance of $\pm 5\%$.

Exhaust capacity of the furnace in case of exhaust hood

	hood open	hood closed
■ Charging	18,000 Bm ³ /hr	-
■ Melting	-	9,000 Bm ³ /hr
■ Pouring	18,000 Bm ³ /hr	-
■ Holding	-	9,000 Bm ³ /hr

with a negative pressure of 1,500 Pa on the connection flange.

Proper operation of the furnace plant

The furnace plant is designed for melting cast iron. The material to be molten down must be lumpy, clean and free from fluid and emulsion.

The furnace plant has been rated for melting at maximum power using the DUOMELT power distribution system. The scope of supply of OTTO JUNKER GmbH includes the furnace plant as specified and the documentation for operation of the furnace plant.

The metallurgical and process specific know-how for producing suitable material qualities does not form part of the scope of supply of OTTO JUNKER GmbH.

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SCOPE OF SUPPLY**BASIC FURNACE PLANT****1.1 MEDIUM-FREQUENCY CRUCIBLE INDUCTION FURNACE**

- water-cooled induction coil fabricated from low-loss copper sections, with heat-resistant electrical insulation. The coil is braced radially by the yokes and vertically between furnace top and furnace bottom.
- yokes of transformer sheet laminations for deflecting the magnetic field and screening of the magnetic field at the furnace bottom
- furnace top with integrated pouring spout and refractory ceramics for vertical bracing of the coil
- tiltable furnace body including furnace platform with refractory ceramics in the furnace bottom welded of plates and sections, with axles and bearings,
- tilting cradle welded of plates and sections, designed to carry the above-mentioned furnace body,
- hydraulic cylinder with self-closing valve and hard chromium-plated pistons, including guard against metal splashes
- water-cooled power cables from the furnace coil to the capacitor module (2 m from furnace pit rear wall)
- water distributor
- water collector with temperature switches for monitoring the cooling water temperatures per circuit as well as flowmeter and temperature indicator in the overall water return line
- earth rod for earthing the bath and crucible breakthrough monitoring system
- sound insulation on the furnace, consisting of:
 - silencers behind the yokes
 - sound insulation around the coil
 - mechanical isolation of the furnace platform
- preparation of the furnace bottom for crucible push-out device
- front plate for mechanical protection of the furnace cradle

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- lost former fabricated from welded steel sheet

1.2 HYDRAULIC POWERPACK

- high-pressure pump
- motor
- oil tank with optical fluid level gauge
- valve block
- return filter with optical control
- non-return valve
- pressure gauge, ball cock

**1.3 MEDIUM-FREQUENCY OSCILLATING CIRCUIT CONVERTER OF DUOMELT
DESIGN**

- surge suppressor unit
- rectifier with power semiconductors in three-phase bridge circuit
- smoothing device in the DC link circuit
- inverter with power semiconductors in bridge circuit
- RC circuits for rectifier and inverter bridges
- transducer set for current and voltage
- digital converter control system
- automatic maximum power control system with overcurrent and voltage limitation
- short-circuit protection by rapid opening of the circuit breaker
- PLC Simatic S7 315-2 DP for control and monitoring of the furnace plant
- water distribution of the converter with:
 - flowmeter (with electric contact)
 - dirt filter
 - thermometer and fittings

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Electrical supply (to be provided by customer)

auxiliary circuits	400 V	three-phase	50 Hz
lamp voltage	230 V	a.c.	50 Hz

1.4 CAPACITOR MODULE

- medium-frequency capacitors with aluminium casing according to VDE 0560, part 9
- hand-operated isolator for galvanic isolation of the furnaces for maintenance work
- the required busbar routing
- water distribution of the capacitors with:
 - flowmeter (with electric contact)
 - dirt filter
 - thermometer and fittings

1.5 CONTROL AND OPERATOR DESK WITH MELTING PROCESSOR "JOKS"

- Siemens industrial PC with integrated 15" TFT colour monitor and operating system Windows XP
 - function keys for furnace plant operation
 - interfaces
 - serial
 - USB (5 x)
 - DVI
 - Ethernet (2 x)
 - modem for telcdiagnosis (telephone line by customer)
 - push button "check signal lights"
 - push button "horn Off"
 - push button "cancel alarm"

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- selector switch "JOKS On / Off"
- potentiometer for stepless power adjustment
- earth leakage monitoring system with mode selector switch, auxiliary earth rod and analog display
- "EMERGENCY STOP" button
- signal horn
- joystick for the hydraulic furnace tilting
- push button "MEDIUM FREQUENCY ON" with signal light
- push button "MEDIUM FREQUENCY OFF"
- push button "open exhaust hood"
- push button "close exhaust hood"
- push button "exhaust hood in charging position"
- key switch "circuit breaker closed / open" with signal light

We recommend the use of the temperature measuring device (item 4.1).

THE PROGRAMME FOR THE MELTING PROCESSOR "JOKS" INCLUDES

- ❖ Measurement of the furnace content
- ❖ Calculation of the required melting power
- ❖ Calculation of the melting time
- ❖ Automatic input of the calculated power
- ❖ Calculation of the required power for heating to set point temperature
- ❖ Calculation of the heating time
- ❖ Heating of the furnace content to the required set point temperature
- ❖ Automatic power input for holding at temperature
- Monitoring of the cooling water temperatures in the furnace cooling circuits with fault alarm display on the screen

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- Automatic sintering of the furnace (time-controlled)
- ❖ Assessment of the mean refractory lining wear and presentation on the screen up to an admissible maximum of wear
- Display of fault alarms and storing with time and date
- Fault alarms sortable based on time and frequency of occurrence for statistic evaluation
- Trend diagrams for data monitored by the process control system
- Logging of the operating data:
 - Charge protocol, shift protocol, monthly protocol
 - Production data over selectable time periods
- ❖ These items are not available when using the melting processor "JOKS" without weighing system. The following programme functions will then be added:
 - melting and heating according to preset filling level
 - automatic holding according to preset filling level

**1.6 AIR-COOLED OIL-IMMERSED RECTIFIER TRANSFORMER
(ACCORDING TO VDE 0532/IEC 60076-1 AND 61378-1)**

- dehydrating breather
- Buchholz relay (alarm and cut-out)
- temperature monitoring (alarm and cut-out)
- Cooling: ONAN
- indoor installation
- wheels (movable in two directions)
- rated for max. 40°C ambient temperature
- connection terminals, type of enclosure IP00

OPTIONS – CRUCIBLE FURNACE**2.1 PIT GUARD SYSTEM**

- frame protecting on three sides, activated when the furnace is tilted,

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- gas pressure springs with protection cylinder for moving the protection frame

2.2 REFRACTORY MATERIAL FOR THE FIRST LINING

- ramming mix for the first crucible lining on the basis of a
- quartzite mix
- insulating plates

2.3 EXHAUST HOOD, HYDRAULICALLY TILTABLE IN ONE DIRECTION

- exhaust hood with integrated cover and hydraulic tilting device
- movable connection flange arranged in the tilting axis of the furnace
- exhaust opening above the pouring spout for sucking-off flue gases when pouring
- refractory lining of the cover
- hydraulic cylinder with load brake valve and hard chromium plated pistons including guard against metal splashes
- limit switch for monitoring the hood position
- The exhaust system is effective during
 - charging
 - melting-down
 - holding
 - tilting of the furnace for pouring
 - deslagging

2.4 WEIGHING SYSTEM

- load cells integrated in assemblies ready for installation
- protection boxes
- cable connection box for parallel connection of the load cells
- display and evaluation effected in the melting processor "JOKS"
- display step in rest position: 10.0 kg

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- Tare ON
- Tare OFF
- RESET

2.5 TILT ANGLE CORRECTION DEVICE

- The tilt angle correction device allows for indicating the current furnace contents even when the furnace is tilted.
- Display step in tilting position: 10.0 kg

2.6 EMERGENCY TILTING DEVICE

- compressed gas operated hydraulic pump installed on the hydraulic powerpack
- nitrogen pipe between pressure reducer and pump
- pressure reducer
- manually operated stop cock to be supplied not installed

2.7 CRUCIBLE PUSH-OUT DEVICE

- hydraulic cylinder for suspension on the furnace bottom
- valve on the hydraulic powerpack
- couplings and hoses (5 m)
- 2 push buttons installed in the operator desk

OPTIONS - RECOOLER**3.1 RECOOLER WITH WATER/WATER COOLER FOR CONNECTION TO COOLING
TOWER WATER****A) FURNACE CIRCUIT (STANDARD STEEL)**

- water/water cooler
- thermometer and pressure gauge
- operating and stand-by pump with automatic change-over

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- dirt filter with bypass
- closed expansion vessel with filling and safety valve
- conductivity meter
- automatic emergency water supply (connection to town's water)
 - solenoid valve (open when deenergized)
 - dirt filter
 - shut-off valve

B) SWITCHGEAR CIRCUIT (STAINLESS STEEL)

- water/water cooler
- thermometer and pressure gauge
- operating pump
- closed expansion vessel with filling and safety valve
- conductivity meter

Control of the recoler is effected by the PLC.

OPTIONS – JOKS**4.1 TEMPERATURE MEASURING DEVICE**

- processing of the temperature measuring signal in the PLC
- immersion measuring lance including 100 measuring heads
- display on the JOKS screen

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OPTION - SHIPMENT**5.1 PACKING AND SHIPMENT**

- packing
- shipment according to Incoterms 2000
as per commercial conditions FCA Otto Junker

PAINTING

- Furnaces and machines
 - Casings (exposed to heat) RAL 9006 white aluminium
 - Sections RAL 5015 sky blue
 - Piping DIN 2403
 - Safety equipment DIN 4844
- Electrical equipment
 - Switch cubicle RAL 7035 light grey
 - Control desk RAL 7035 light grey

**TECHNICAL DOCUMENTATION (ACCORDING TO OTTO JUNKER STANDARDS
IN 1 COPY)**

- Equipment planning
 - Arrangement plan
 - Foundation plan (without statical analysis)
 - Piping plan
 - Cable plan
 - Cooling water diagram
 - Operating instructions of re cooler
- Mechanical engineering

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- Assembly drawings
- Parts lists
- Operating instructions of furnace
- Electrical engineering
 - Circuit diagrams
 - Parts lists
 - Terminal plans
 - Operating instructions of switchgear
- Declaration of conformity and CE sign
- Spare and wear parts lists

STANDARDS AND SPECIFICATIONS

- Electrical utilities 73/23/EWG
- Machinery 98/37/EG
- Electromagnetic compatibility (EMC) 89/336/EWG
- Design of the switchgear EN 60204-1:1997

EXCLUSIONS

- **All supplies and services not explicitly indicated in the scope of supply as well as:**
- circuit breaker with short circuit protection and surge suppressor as well as undervoltage trip
- switching and measuring instruments if required on the transformer primary as well as any filtering equipment for harmonics or radio frequencies, if required by the local power supply company
- high-current busbars and cables between the circuit breaker and the high-voltage connections on the transformer
- supply lines for power and water up to the determined connection points
- connection lines for power and water between the individual modules
- all templates for castable and ramming formers (drawings from JUNKER)
- hydraulic fluid
- collecting trough for hydraulic fluid

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- all civil work and supporting structures to accommodate the scope of supply including the required sound insulation, fire protection measures, ventilating systems, staircases, covers for ducts, manholes, balustrades and doors
- design of the emergency collecting pit according to VDG instructions (Association of German Foundrymen)
- guarding facilities for the operating personnel
- required auxiliary equipment (such as slag skimming tools, slag ladle, ramming tools)
- exhaust gas piping from connection flange of the furnace
- required personnel for installation and commissioning as well as required tools and hoisting gear for installation
- transportation from the place of unloading to the place of installation
- nitrogen cylinders including cylinder connection for emergency tilting
- electric connection and hoisting gear for the crucible push-out device
- compressed air connection for lining work, if any required
- cooling tower circuit
- cooling water basin for the cooling tower
- pipes and attachment material for the water recoler
- all cooling agents including frost protection, if any required
- drinking water protection according to local regulations

SUBSUPPLIERS' SPECIFICATION

DESIGNATION	MANUFACTURER	TYPE
FURNACE		
Coils	OTTO JUNKER	copper section
Yokes	OTTO JUNKER	silicon steel sheets
Hydraulic cylinders	Iloven	standard
Thermometers	Jumo	MTW 60
Flow monitors	Kirchner & Tochter / Bürkert / Krone	
Hydraulic powerpacks	to be selected by OTTO JUNKER	

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Hydraulic valves	Bucher	
Hydraulic fluid		mineral oil

CONVERTER / CAPACITOR MODULE / CONTROL AND DISPLAY DESK

Rectifier thyristors	Westcode	
Inverter thyristors	Westcode	
Control system of power electronics	OTTO JUNKER	digital
Main switches < 630 A	Moeller	P or NZM
Main switches > 630 A	Siemens	Sentron
Local isolators	Kraus & Naimer	KG
Push buttons and indicator lights	Moeller	RQM-Titan
Joysticks	Gessmann	
Control switches	Moeller / Kraus & Naimer	
Auxiliary contactors	Siemens	Sirius 3RH
Contactors	Siemens	Sirius 3RT
Miniature circuit breakers	Siemens	
Screw-in fuse links		Neozed
L.v.h.b.c. fuse links	Siemens	
Relay modules	Phoenix	
Thermistor motor protection relays	Dold	
Earth leakage monitors	Dold	
Contactors safety combinations	Pilz / Siemens	
Safety temperature limiters	Juchheim	
Motor protection circuit breakers	Siemens	Sirius 3RV
Control-circuit transformers	Siemens	multi-voltage design
Measuring transducers	Camille Bauer	
Temperature measuring transducers	Phoenix	
Current transformers	KWK	

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Voltage transformers < 80 Hz	KWK	
Voltage transformers > 80 Hz	Sangl	
Programmable controllers	Siemens	S7-315
Line-up terminals	Weidmüller	WDU
Busbar systems	Wöhner	
Operator desks	Rittal / Lohmeier	
Terminal boxes	Rittal / Rose	
Frequency converters	Siemens	
Pointer-type instruments current/voltage	Debnar	96 x 96 mm
High-current and capacitor contactors	Homa	
Power thyristors	Westcode	
Capacitors	OTTO JUNKER	
Switch cubicles	Rittal	TS (RAL 5015)
Converter cabin	Eupen Metall	RAL 5015
Earth leakage monitors	OTTO JUNKER	
Current transformers	KWK	
Industrial PC with TFT monitor	Siemens	PC677
Connection JOKS / PLC	Siemens	Profi-Bus DP
Weighing system	Sartorius	

TRANSFORMER

Rectifier transformer	to be selected by OTTO JUNKER	oil-cooled/air-cooled
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RECOOLER

Pumps	Johnsen	
Mixing valves	ARI / RTK	
Water/water cooler	Funke / Tranter	

POURING FURNACE FOR GREY IRON

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1. Description

FOMET automatic pressure pouring furnace Dupour type PR-3/200, with refractory lining installed on furnace.

Furnace case with interchangeable siphons, frames and furnace cover.

Interchangeable inductor with air cooling system

Oil hydraulic system for tilting and emptying the furnace

Automatic system for positioning the furnace on axis "X" with motor gear device and position transducer

Automatic pouring system with hydraulic stopper and control equipment with Allen Bradley plc and supervision system to manage the pouring operation via video operator terminal

Three-phase, low voltage, balanced electrical system for furnace power control

Moulds and tools to install refractory lining

Melt-out cast iron mould channel for furnace start-up

Set of nozzles and stoppers for commissioning

Connections for hydraulic oil, electrics and electronics in and between machine parts, excluding connections to energy supply points

Electronic furnace weighing system

Laser system for check of level in pouring spout and level in ingate cup

Powder inoculation device

Automatic system to lift the pouring unit 200-250 mm

Gas burner for sintering refractory lining and for heating of pouring siphons

Stationary platforms and fixed operator platforms

2. Technical data

Total furnace capacity:	kg	4000
Useful pressure pouring capacity:	kg	3000
Installed power:	kVA	250
Inductor rating:	kW	200
Holding power to maintain 1400°C (full furnace at rest)	kW	60
Superheating rate for 50°C	t/h	10
Command voltage	V	400
Electrical power factor	Cos φ	0.95
Inductor air cooling power	kW	3
Oil hydraulic pump motor power	kW	5.5

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Furnace positioning movements:

-Parallel to moulding line	mm	± 500
-Across to moulding line	mm	1500

3. Documentation

Foundations drawing
Lay-out drawing
Electrical scheme
Wiring specifications
Hydraulic scheme and piping specifications
Pneumatic scheme and piping specifications
Drawings of the refractory-linings
Channel form drawing
FOMET software
Recommended list of spare parts
Instructions and manuals

4. Exclusions in delivery

Foundations and underground passages
All lifting and discharging, positioning and moving of the plant and equipment on site
Control room for installation of the electrical equipment
Connecting isolator cabinet to high voltage
All the energy sources and utilities required for the installation and commissioning of the plant
All electrical, hydraulic and pneumatic connections between the furnace parts and to the supply points
Oil for the hydraulic plant
Electrical and hydraulic workers for furnace installation
All additional platforms, ladders etc. not attached to the furnace and necessary to the installation and for the maintenance operation of the equipment
Insurance for all accepted risks, excluding civil unrest etc.
All what has not been specified in the DISA quotation

TURBINE MIXER, Type SAM 6-70

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1. Description

The SAM mixer is a fast high efficiency mixer for bentonite bonded foundry sand. The mixer is based on a large submerged turbine rotating in a stationary bowl. Sand is charged from the top and discharged through the bottom assisted by gravity and efficient scrapers. The design is service friendly with easy access to wear parts, mowing parts and lubrication points.

2. Main Specifications**Technical Data**

• Batch capacity:	1,750 kg
• Cycle time and capacity with compactability and sand strength control:	120 sec, 52.5 t/h
• Cycle time and capacity with moisture control only:	100 sec, 63 t/h
• Mixing time:	80 sec
• Drives:	
• Stirring unit:	55 kW
• Turbine:	110 kW
• Exhaust volume:	1000 m ³ /h
• Weight (tara)	9,300 kg

3. Requirements**Sand Requirements**

The stated capacity and cycle time is based on use of good quality bentonite, inlet sand temperature max. 45°C and inlet sand moisture content min. 1.8%.

Control Cabinet

The buyer must provide or buy a DISA control cabinet including soft starters, cabling etc. built according to DISA specifications to run and protect the mixer.

Sand Supply

The buyer must supply or buy a DISA sand conveyor or similar capable of dosing the required sand amount into the sand hopper within approx. 60 sec.

Exclusions

As far as not explicitly made evident in the quotation, further supplies and services for installation, completion and operation of the plant have to be rendered by the Buyer as for instance:

- supporting structure in accordance with the local installation
- assembly of the water dosing device
- supply system for compressed air
- erection and commissioning

Discharge

A sand receiver should be placed directly below the mixer. The recommended capacity is 2 times the mixer capacity.

4.1 Scope of Supply**Mixer Bowl**

Made in a strong, welded construction, convex hood, supporting the complete drive unit. On the top there are inlet openings for sand and additives. In the bottom there is an electrically operated rotary slide gate for letting out sand. The bottom and the bowl wall are supplied with exchangeable wear lining plates.

Unit Drives

Completely removable from top, consisting of a gear motor for the stirring unit and a standard motor with a toothed belt drive for the turbine. Bearings are greased for life or running in an oil bath. The motors are of a high efficiency type for reduced power consumption. Voltage and frequency according to customer specification. (Type of design B3, type of protection IP 54), for vertical mounting and with PTC-resistor flange type, for driving the turbine.

Rotational Stirring Unit

With turbine, wall scraper, bottom plough and water spraying device.

Turbine

With easily exchangeable blades with wear resistant cladding, running in strong ball bearings hermetically sealed against sand and dust.

Central Column

With rotating bottom plough of special cast iron scraping edge reinforced with hard metal.

Wall Scraper

Fixed to the stirring unit, rotating, with scraping edge reinforced with hard metal.

Water Addition Unit

Through the mixer bottom and the central column with a rotating spraying pipe and numerous spraying nozzles.

Squirrel Cage Flat Geared Motor

In special design for the drive of the stirring unit, completely enclosed, surface cooled (type of design V1/H/A, type of protection IP65) for horizontal mounting and with PTC-resistor temperature probe.

Safety System

The mixer is built according to European standard (CE) all moving parts are shielded and painted red or yellow. The service door is protected by an electric safety switch with delay and removable keys.

TURBINE MIXER, Type SAM 6-70**Page 3/3****Painting**

The mixer body is coated by a zinc based shop primer and a blue top coating RAL 5024.

4.2 Options

Optional features are only included if specifically mentioned in the quotation.

Weigh Hopper for Sand, SAMW-6/1750

Made of stainless steel with necessary ribs and support, with cover and segment gate and 3 load cells. Discharge gate is operated by a gear motor.

Capacity: 1750 litres

Weigh Hopper for Additives, SAMP-6/150

Made of stainless sheet steel with necessary ribs and support, with cover, pneumatically operated discharge gate and support on 3 load cells.

Capacity: 150 litres

Bond Injection

For injecting additives through the side wall of the mixer by compressed air in installation where gravity feeding is not possible.

Expansion Bag

Reducing emission of dust when charging the mixer.

Ceramic Lining

As an alternative to steel linings, the bottom and inner wall can be delivered with a 12 mm thick ceramic lining of specially made tiles, which are very resistant to the tough wear of moulding sand.

DISA SMC

A DISA Sand Multi Controller for continuous in-line control of sand properties and mixer control (see special description)

DISA 130 MOULDING SYSTEM

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1. **Description**

The DISA 130-A Moulding System (DMS) is an advanced, PLC-controlled, vertical, green sand moulding system for Medium-speed production of close-tolerance iron, steel, Aluminium and other metal castings. The basic equipment consists of the Moulding Machine (DMM) in combination with the Automatic Mould Conveyor (AMC) System.

A large number of auxiliary units may be incorporated, for example a Core Setter (CSE), a Quick Pattern Change Unit (QPC), a Synchronised Belt Conveyor (SBC), and a Cooling Drum (CDR), depending on the type of castings to be moulded.

Note: The DMS is as standard supplied with a "Manual core setting mode". In cored jobs we only recommend this mode in case of short series or in test runs. Long run cored production requires a Core Setter.

2. **Main Technical Data**2.1 **Mould Dimensions***

Standard (2013 MK5-A pattern plates): 480 x 600 x 120 ... 395 mm (H x W x T)

* Maximum obtainable mould pitch is based on minimum pattern plate thickness and compressibility of max. 25%.

2.2 **Maximum Moulding Speed based on Equipment Design Criteria**

The DISA 130-A Sand Moulding System is designed to operate at the following maximum moulding speed:

Mould Pitch in mm	Uncored Moulds/hour	Cored Moulds/hour*
150	344	314
200	344	314
250	324	301
300	304	289
350	284	276
395	264	264

• Cored castings using a DISA 130-A Core Setter (CSE).

Note. The above figures will be affected by the moulding parameters described below that will be adjusted individually for each casting to be produced on the DISA 130 Moulding Line.

DISA 130 MOULDING SYSTEM

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The above table applies to a mould string of up to a total length of 30 m conveyed on the standard DISA 130-A AMC/SBC pouring and cooling lines. The table shows the maximum production speed, based on the settings of the machine and supply of materials, as specified in Section 2.5 and 2.6 respectively.

The DISA 130 Moulding System must be correctly installed and adjusted.

The table shows the *obtainable* maximum moulding speed, which has been achieved by the equipment under ideal conditions. The actual moulding speed achieved by the end user will differ in accordance with the parameters outlined in the following paragraphs.

2.3 Moulding Speed expected to be obtained during Normal Production

The production of castings is a process involving many variables, each of which exerts a separate effect on the desired product - high quality, saleable castings. The DISA 130 Moulding System is only one element in the whole casting process, and one that relies heavily on skilled personnel, a stable supply of material, and other support equipment in order to operate at its full potential (see also Section 7.0 "The DISA Industries A/S 130 Customer Commitment"). The customer is advised to carry out a loading study to determine the expected production capacity for each particular casting. The following sections provide some relevant material for conducting such a study.

2.4 DISA 130 Equipment

A number of machine settings - some of which influence the cycle time/moulding speed - are adjustable so as to cater for the production of castings with various pattern complexities. These settings again fall into two groups: Selected settings used in normal operation, and special settings intended only to be used under certain circumstances: e.g. when a pattern plate has deep pockets, or there are heavy cores in relation to the vacuum area of the core mask. The table in Section 2.2, Maximum Moulding Speed, is based on settings, which apply to non-complex patterns and normal cores.

2.5 The Maximum Moulding Speed is also dependent on the following

The length of the AMC and the SBC can be selected to allow for a certain cooling time. The total AMC and SBC length will affect the moulding speed in the following way: for mould strings longer than 30 m the Moulds/Hour figure is reduced by 3.3 moulds for each 10 m exceeding 30 m. With the maximum possible conveyor length of 86.5 m (AMC + SBC) the Moulds/Hour figure is reduced by 20 Moulds/Hour.

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2.6 Supply of Materials

Depending on the moulding speed, the system allows a certain amount of time for sand supply, for manual insertion of the cores into the core mask of the CSE, and for pouring metal into the moulds. If for some reason more time is required, the cycle time will be prolonged accordingly.

Sand, cores and metal must be supplied in sufficient quantities in order not to delay the operation of the DISA 130 Moulding System.

The table below shows the amount of time, which the system provides for each of these functions at different moulding speeds:

Production without cores

Mould depth in mm	Pouring time sec	Sand filling time sec
200	~8.0	~6.5
300	~8.5	~7.0
400	~9.5	~8.0

Production with cores

Mould depth in mm	Core setting time sec	Pouring time sec	Sand filling time sec
200	~7.5	~9.0	~7.5
300	~8.5	~9.5	~8.0
400	~9.0	~10.0	~8.5

Note. Please note that the above figures are preliminary as they have not yet been verified in test. They are based on the best available estimates for the time being. Actual performance in real life operation may show slightly different figures.

2.7 Up-Time

Keeping the up-time of the DISA 130 Moulding System at a high level depends strongly on the implementation of a preventive maintenance programme (Option is CIM 5.0), the ability of personnel to diagnose faults and to repair the system, and on access to spare parts in the foundry.

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3. Mould System Requirements**3.1 Electrical System Requirements**

- Power Supply: In accordance with IEC-204-1 standard.
 - Line Voltage: Three phases with protector ground between 200 and 575 V AC ($\pm 10\%$), 50 or 60 Hz ($\pm 2\%$), in accordance with Buyer's specifications.
 - Average Power Consumption: 60 kW
 - Connected Load: To be advised
 - Control Voltage: 24 V DC.
- Voltage transformation is installed in the control cabinet of the DMS.

Note

The indicated average power consumption and connected load are typical figures for an installation consisting of a DISA 130-A Moulding Machine equipped with Core Setter, Sand Supply Unit and approximately 50 m AMC/SBC.

3.2 Compressed Air Requirements

A typical figure for the aforementioned installation is:

- Average Consumption: 11 m³/minute free air.
- Air Pressure: Min. 5.5 bar; max. 10 bar.

3.3 Cooling Water Requirements

A typical figure for the aforementioned installation with is:

- Average Consumption: 20 litres/minute at 15°C inlet temperature or 110 litres/minutes at 30°C inlet temperature.
- Water Pressure: See specification sheet for the DISA 130-A DMM.

4. Control System

- 4.1 The entire electrical power supply and electronic controls for all units of the DISA 130-A Moulding System are housed in a control cabinet mounted on the back of the moulding machine. If required the control cabinet will be supplied with a cooling system. The control system is based on an industrial type PLC (Programmable Logic Controller). The control system is programmed to monitor the precise positions and velocity of the moving components in the Moulding System and ensures synchronisation of the moulding machine with its auxiliary equipment.

The PLC has non-volatile memory and is programmed for self-diagnostics of the electrical hardware.

- 4.2 An important part of the control system is the visual display unit (VDU) which provides the operator with the following information in literal text (using the Latin alphabet) on a colour screen:

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- Instructions for use, stop causes, error messages and how to correct error and restart
- Compressibility of the moulding sand
- Pattern plate data
- Production rates and cycle times

Please note that some languages using special characters are also available on request.

- 4.3 The basic programme of the control system can simultaneously hold two sets of pattern plate data, more than 15 different parameters per pattern plate set, i.e.:

- (1) The current pattern plate set in production
- (2) The next pattern plate set to be used.

- 4.4 The pattern related data and other operating commands are entered into the control system via a keypad placed on the operator's panel. Based on these data, the mechanical, electrical, hydraulic and pneumatic adjustments of the moulding system are automatically executed by the electric control system. Once the parameter settings for a given pattern plate set have been determined the values can be stored in CIM module, CIM-8.0, installed on an external Cell Controller PC.

5. **Modules for Computer Integrated Manufacturing (CIM)**

Information and description of the individual CIM modules are given in the respective specification sheets.

6. **Technical Documentation**

DISA Industries A/S will supply technical documentation concerning installation, preparation of pattern plates, instructions for use, maintenance, fault-finding, repair and the protection system - as specified in detail in specification Sheet DISA 130-A DOC.

The technical documentation concerning installation and pattern plates as well as the Application Manual will be supplied in advance.

Additional copies of the technical documentation can be supplied at current prices.

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7. The DISA Industries A/S Customer Commitment**7.1 Installation and Start-up**

It is important that the installation manual is studied very carefully prior to the installation and that all the instructions are followed.

Installation and start-up must be supervised by personnel authorised by DISA Industries A/S.

To achieve the best possible result the future operating and maintenance personnel must take part in the installation, and the customer is obliged to secure the necessary resources. The customer is also obliged to have the future operating and maintenance personnel available for training in the DISA 130 Moulding System.

7.2 Operation and Maintenance Personnel

The DISA 130 Moulding System is operated and maintained by human beings. If the customer fails to provide skilled personnel, the result will often be reduced performance of the DISA 130 Moulding System and unnecessary downtime.

Operating Personnel. The DISA 130 Moulding System is a sophisticated set of machine units for high-quality precision mould production, requiring skilled operating personnel, trained in operating the equipment, with clear understanding of the functions of the entire sand moulding system. Before start-up of production, DISA Industries A/S strongly recommends that the operating personnel participate in a course arranged by DISA Industries A/S.

Maintenance Personnel. For the same reason, the DISA 130 Moulding System requires skilled maintenance personnel, experienced and trained in mechanical, hydraulic, pneumatic and electronic systems. DISA Industries A/S strongly recommends that the maintenance personnel participate in a course, arranged by DISA Industries A/S, dealing with preventive maintenance, trouble shooting and repair of the DISA 130 Moulding System. It is important that the maintenance personnel have several years of experience in servicing automated production equipment to obtain the full benefit from our maintenance courses. It is essential that maintenance personnel have participated in this training programme before the equipment is put into operation.

7.3 Preventive Maintenance

The DISA 130 Moulding System is designed and constructed to provide its owner with many years of quality service. However as with any item of machinery, it must be properly maintained in order to perform to its full potential. The only way for the owner to ensure that this is the case is to implement a quality-oriented preventive maintenance programme, and to this end DISA Industries A/S provides a recommended schedule of preventive maintenance.

As an option DISA Industries A/S also offers a special software programme, see Specification Sheet CIM-5.0, Preventive Maintenance Module.

Failure by the owner to provide qualified preventive maintenance will lead to unintentional abuse of

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the equipment, which results in increased equipment down-time and maintenance costs, and reduced performance of the DISA 130 Moulding system.

7.4 Spare Parts

The mechanical parts used in the DISA 130 Moulding System are especially chosen for their durability and long life. Precision components such as tie rods, bearings, wear plates etc. are particularly important, since their quality and dimensional accuracy directly affect the quality of the mould produced. The owner should therefore use only the highest possible quality of spare parts. The use of substandard materials will result in poor DISA 130 Moulding System performance.

7.5 Process Control

- Moulding sand must be supplied to the DISA 130 Moulding Machine in accordance with the specifications recommended by DISA Industries A/S in the Application Manual.
- Molten metal must be supplied with the proper alloy and in sufficient quantities. The temperature of the metal must be correct, and the temperature range must be stable if good castings are to be obtained.
- Pouring of molten metal. Whether the pouring of molten metal is carried out manually or by a mechanised pouring device, it must be done according to the guidelines given by DISA Industries A/S. Pouring must take place within the time allowed for pouring in order not to delay the automatic operation of the DISA 130 Moulding System. To obtain an efficient pouring time DISA Industries A/S offers a CIM module.

7.6 Pattern Plate Layout and Pattern Plate Tooling

The DISA 130 Moulding System is designed to operate most effectively when certain basic production parameters are selected. These parameters are specified in the Application Manual and relate to the layout of the patterns on the pattern plates and the placing of the core in the core masks. There are guidelines in the manual, which describe the ideal design, weight and configuration. Overloading the pattern plates results in increased casting scrap, reduced production and potential damage to the DISA 130 pouring and cooling conveyors.

The Pattern Plate Tooling used on the DISA 130 Moulding System must conform to the quality and dimensional tolerance standard specified by DISA Industries A/S. Since the quality of the tooling directly affects the quality of the mould produced on the DISA 130 Moulding System, the use of sub-standard or poor quality tooling will result in equally poor castings.

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7.7 Core Configuration and Strength

The cores used in the Core Setter (CSE) must conform to the density, strength and dimensional tolerance standards specified in the DISA 130 Application Manual.

7.8 Support Equipment

The DISA 130 Moulding System is designed to operate automatically and is normally interlocked with other foundry support equipment, e.g. sand plant, pouring unit and shake out. To ensure that the DISA 130 Moulding system operates at its full potential, all of the related support equipment must operate continuously and without delaying the DISA 130 Moulding System.

DISACOOOL 2900 Cooling Drum

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1. Description

The DISACOOOL 2900 Cooling Drum combines shake-out, sand cooling and casting cooling in one smooth process. The gentle tumbling has a precleaning effect on castings. Furthermore, the cooling drum breaks up the sand lumps and then screens the sand, ready for recycling.

The drum is made as a cylinder, rotating on heat resistant rubber wheels and driven by friction. The cooling effect comes from evaporation of water and a counter flow of air.

2. Main Specifications**2.1 Technical Data**

Total Capacity, Sand and Metal	50,000 kg/h
Temperature of Sand at Exit	Approx. 45°C-65°C.
Temperature of Castings at Exit	Approx. 75°C (typical) see 2.2
Average processing time	20 – 25 min
Diameter drum body, mm	2,900
Rolling ring diameter, mm	3,330
Length, mm	12,500
Inlet opening (diameter), mm	1,400
Outlet opening (diameter), mm	2,300
Approx. weight	23,000 kg tara
Colours	Drum body - orange RAL 2003 Frames - Blue, RAL 5024
Speed	3.0 RPM
Motor power	2 x 22 kW
Water consumption	1 – 2 litres per 5 kg poured iron

2.2 Temperature of Castings at Exit

Approx. 75°C (typical). Actual exit temperatures depend on casting input rate and temperature, sand-to-metal ratio, volume-to-surface ratio (module) of castings, cored/uncored castings, ambient temperature and humidity. DISA Industries A/S should be consulted concerning actual casting programmes.

3 Requirements**3.1 Sand-to-Metal Ratio**

5:1-10:1.

3.2 Standard Max. Permissible Casting Temperature at Inlet

700°C.

3.3 Air Exhaust Requirements

The ventilation system needs a capacity of approx. 25,000 m³/h, depending on sand/casting input rate and temperature, room temperature and humidity.

At ambient temperature 25°C and relative humidity 80%, the ventilation required to carry away the water vapour is 5,300 m³/h per ton produced cast iron per hour. If a burner is installed to raise the exhaust temperature from 55°C to 65°C, the need for ventilation will be reduced to 3,200 m³/h per ton cast iron per hour. For production of more than 4 t metal (cast iron) per hour, we recommend installing a burner to avoid condensation in the ducts. Please note that a certain volume of false air will normally also be exhausted from an acoustic booth covering the vibratory feed conveyor at drum inlet, and this will increase the air exhaust requirements from drum and cabin.

3.4 Following equipment is not included

The buyer must provide the Equipment listed below or buy it from DISA. It is not included in the standard package unless specifically mentioned in the quotation.

- Vibratory feed conveyor at drum inlet
- Suction hoods and ducting
- Chutes for sand and castings
- Foundation bolts
- Connection between water dosing unit and water spray pipe
- Support for water spray pipe
- Support for back spill plate
- Cables and cable trays
- Any acoustic enclosures or cladding for the drum or vibratory conveyor
- Conveyors for sand and castings discharged from the drum

- *If a long row of unpoured moulds is introduced into the drum, there may be lump carry-over with the castings. A means of separating such sand lumps from the castings after casting discharge is recommended*

- Filter and ducting for air extraction from drum and acoustic booth
- Electrical panel for control of start/stop of the cooling drum
- Any gas, electrical or other heating of air extracted from the drum

4 Scope of Supply

4.1 Standard Equipment Package

The cooling drum consists of following items, other items are only included if specified in the quotation

- 1 Drum body with roller rings and screening section.
- 2 Frame assemblies each with wheels, planetary gear(s) and electric motor(s)
- 1 Rotation guard switch
- 1 Back spill plate at drum entry
- 1 Temperature sensor for outlet sand
- 3 Sets of technical documentation concerning installation, instructions for use, and maintenance

4.2 Options

The optional features mentioned below are only included if specified in the quotation.

4.2.1 Water Dosing System

See separate Specification Sheet.

4.2.2 Secondary Sand Cooling and Remoistening, SCR

SCR is used to give additional cooling and remoistening of return sand following the DISACOOOL. *(See also separate Specification Sheet)*

4.2.3 Gas Burner

The gas burner heats the exhaust air from the DISACOOOL, preventing condensation in the ducts and the filter.

The scope of supply also comprises:

- Gas burner 185 kW (max.)
- Electrical control panel
- Accessories for the burner
- A temperature sensor for measuring the temperature in the ducts

The burner will typically be set to an effect of 80 kW corresponding to a gas consumption of 7-10 m³/h (natural gas). The need for burner operation will depend on:

- Season: In the summer the ducts will often need to be heated in the morning only, whereas winters may necessitate a 24-h heating
- Production volumes: E.g. a production of less than 4 t cast iron per hour will normally not require heating

Start and stop of burner is controlled via the control panel.

BLAST CLEANING

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1 Technical Data

1.1 Throughfeed Blast Cleaning Machine, type CT-3-45/9-430

Throughput incl. returns	6 t/h
Unit weight max.	50 kg
Workpiece diagonal max.	900 mm
Workpiece temperature max.	100 °C

Attention

Above values largely depend on material, form and characteristics of the work-pieces and are to be considered as reference values which, in case of order, are exactly to be defined by blasting tests in a similar production line.

Optimal blasting results require sand-free, drum-applicative workpieces. We recommend a high quality abrasive of cast steel or cut wire both from a medial hardness of 46 to 51 HRC. Faults on castings as penetrations, blow-outs, burning-ins, sand inclusions etc. are only conditionally cleaned.

Blast machine:

Diameter of inlet and outlet drum	1,315 mm
Blast barrel length (apron conveyor slats, inlet- and outlet drum)	3,800 mm
Sand separating capacity max.	80 kg/min

Blast wheels:

Type	U70 x 500 indirect
Number	3 pcs
Blades per wheel	8 pcs
Wheel speed	2,250 min ⁻¹
Abrasive throwing velocity	80 m/sec
Abrasive flow	3 x 600 kg/min
Wheel power	3 x 45 kW

Initial abrasive filling approx.	10 t
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Recommendation:

High-quality abrasive from cast steel or cut wire pellets, averaged hardness	46 – 51 HRC
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BLAST CLEANING

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Required ventilation capacity	15,000 m ³ /h
Suction pressure in suction duct	1,500 Pa (150 mm SPWG)
Required compressed air at 6 bar	1 Nm ³ /h
Installed total power:	190 kW

1.2 Cartridge filter type RPG-15'000

according to layout.

Technical data:

Exhaust air capacity	15,000 m ³ /h
Static pressure at fan inlet	2,452 Pa
Compressed air requirement approx.	14 Nm ³ /h
Operating pressure	6-7 bar
Number of cartridge filters	16 pcs
Total cartridge filter surface	336 m ²
Air to surface ratio	0.74 m ³ /m ² /min
Exhaust air particulates content	<5 mg/Nm ³
1 three-phase motor suction fan	15.0 kW
Motor speed	1,500 min ⁻¹

1.3 Electric / switching and control voltage

Main voltage	3 x 400 V / 50 Hz
Control voltage	230 V / 50 Hz
Valves and sensors	24 V DC

Electric motors:

3-phase standard squirrel cage motors according to IEC recommendations, protection IP54, insulating class B, for direct on-line or star-delta start.

BLAST CLEANING

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Paintwork*Shot blast machine and conveyors:*

2Components coat of paint	RAL 5024	pastel blue satin frosted
Moving parts etc.	RAI. 1003	signal yellow

Electrical system:

Cabinets	RAL 7035	light grey textured
Cabinet bases	RAL 7022	umbra grey smooth
Mounting plates	galvanized	

Cartridge filter:

Base and top coat of paint	RAL 5024	pastel blue satin frosted
Service platform and ladder	RAL 1003	signal yellow

Noise abatement:

Noise abatement walls and cabins etc. of galvanized design will not receive any painting.

Other colours available at extra charge.

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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1. TECHNICAL DATA

Shot blasting machine type HT 1.6 x 2.0 x 2.5 m

Required floor area	:	approx. 2.6 x 3.3 m
Size of blast chamber	:	1.6 x 2.0 x 2.5 m
Total height of machine above floor level	:	6,375 mm
Foundation pit	:	see separate drawing
Diameter of cluster	:	1,200 mm
Height of cluster	:	1,800 mm
Parts to be shot blasted	:	castings GG motor housings
Capacity	:	approx. 1.5 t/h
Lower edge of cluster above floor level	:	approx. 200 mm
Load of cluster	:	1,000 kg
Number of clusters	:	4
Transport system	:	Overhead monorail conveyor, manually operated as oval circle
First filling of shot material	:	approx. 2 t (not part of our supply)
Electrical connection with de-dusting	:	approx. 61 kW
Consumption of compressed air without de-dusting	:	approx. 2 Nm ³ /h at 5 bar
Noise level	:	85 dB(A)

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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Operation voltage : 400 V, 50 Hz

Shot blasting aggregates:

Number : 3 turbines

Diameter : 380 mm

Blades per wheel : 8 pcs.

Width of blades : 75 mm

Drive power : 15 kW/turbine

Ejection speed : 80 m/s

Shot material circulation : 225 kg/min./turbine

Shot sieving device:

System : Magnetic separator combined with gravity air wash system

Capacity : 675 kg/min. shot material
50 kg/min. moulding sand

% of mould sand in shot material : $\leq 0.2 \%$

% of shot material in moulding sand : $\leq 0.2 \%$

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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Dust extraction and elimination:

Type	:	P - 1
Model	:	TDS - 8
Size	:	1,900 x 1,500 x 4,800 mm
Weight	:	approx. 2,000 kg
System	:	Cartridge filter
Operation	:	continuous
Air capacity	:	8,000 m ³ /h at p = 2,470 Pa
Dust residue in clean gas	:	max. 1.0 mg/Nm ³
Consumption of compressed air	:	approx. 8 Nm ³ /h at 6 bar
Filter area	:	168 m ²
Filter medium	:	LII-Ultraweb
Noise level	:	approx. 85 dB(A)
Installation	:	inside

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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2. TECHNICAL DESCRIPTION**1 Shot blasting machine type HT 1.6 x 2.0 x 2.5 m**

consisting of:

- 1 Housing in simple robust welded construction strengthened by rolled steel sections, with lateral blasting saddle for taking the turbines. The slot in the roof for putting through the hooks is sealed by rubber curtains. The housing is made of material No. 1.3401.
- 2 Double folding doors as charging aperture, automatically actuated, material St 37, with MN steel cladding.
 - 1 Safety cladding
 - a) in the area of the turbines: high alloyed Cr. steel plates with max. 12 % Cr. hardened approx. 62 - 64 HRC, plates up to 25 mm thick;
 - b) in the machine housing, i.e. in the so called "Hot-Area": exchangeable plates of MN-steel, in each blasting station 800 mm width, hung up or fixed by high wear resistant screws. The plates are 10 mm thick.
- 3 Modern high capacity turbines process the material to be cleaned inside the blast chamber. Each turbine is fitted with 8 blades incorporated in a double-disc-wheel. All wear parts of the turbine are made of high alloyed hardened Chromium steel.

The shot is gravity fed into the turbine thus requiring no additional power supply for perfect functioning.
- 1 Bucket elevator for re-transporting the shot material with tensioning station. Fabric-reinforced elevator belt with wear resistant pressed steel buckets, incl. rotary speed control.
- 1 Machine vat with perforated sheet cover, designed as a welded construction.
- 1 Vibrating conveyor chute with automatic coarse material separation for transporting the shot material to the bucket elevator.
- 1 Magnetic separator

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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Consisting of 2 permanent magnetic drums, fitted in a MN steel housing,

- 1 Shot material sieving device in which the mixture of shot material and dirt particles such as scale etc., which were transported upwards by the bucket elevator, is separated and cleaned and therefore only clean shot material is returned to the storage.
- 1 Shot material hopper, mounted above the turbines to receive the cleaned shot material, with min. level indicator.
- 1 Automatic shot material feed, controlled by shell valve.
- 1 Rotation device for the clusters with which the parts to be shot blasted are rotated according to the blasting time pre-selected at the switch cabinet. The turning direction of the cluster is changed after half of the blasting time in order to reach ideal blasting angles on the parts to be shot blasted. The charging and discharging of the clusters out of the blasting chamber is effected by this device.
- 1 Maintenance platform with gratings, ladder etc.
- 1 Ducting
within the area of the shot blasting machine, with pre-separator, and one common connection piece for the ducting between shot blasting machine and filter.

Electrical equipment:

- 3 Motors $P = 15 \text{ kW}$; $n = 3.000 \text{ min}^{-1}$
for the drive of the turbines;
- 1 Geared motor $P = 3.0 \text{ kW}$; $n = 60 \text{ min}^{-1}$
for the drive of the bucket elevator;
- 2 Geared motors $P = 0.1 \text{ kW}$; $n = 4.2 \text{ min}^{-1}$
for the drive of hook rotations in the blasting area;
- 2 Unbalanced motors $P = 0.75 \text{ kW}$,
for the drive of the vibrating conveyor chute;
- 1 Geared motor $P = 2.2 \text{ kW}$; $n = 26 \text{ min}^{-1}$
for the drive of the magnetic drum I;

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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1 Geared motor $P = 0.55 \text{ kW}$; $n = 27 \text{ min}^{-1}$
for the drive of the magnetic drum II

1 Set of magnetic valves, limit switches etc.
for the control arrangement;

1 **Switch cabinet, safety type IP 54**
make Rittal with HVO

for the control of the shot blasting machine and cartridge filter, as well as for the automatic star-delta turn-on of the turbine motors and direct switch-on of all the other motors.

Freely-programmable control (SPS) make Siemens S7-, in corresponding size with OP 7.

The cabinet is completely wired internally, including push-buttons, signal lamps and emergency stop switch as well as ammeters for the turbines, a time clock for the setting of blasting time and a working hour meter, including electric wiring and cables from the switch cabinet to the machine and at the machine. Distance shot blast machine to switch cabinet max. 5 m.

The electrical equipment corresponds to EN rules.

1 **Rail oval made from sectional steel**
designed for a load of 1,000 kg per cluster, incl. support structure.

4 **Transport clusters**
Load per cluster 1,000 kg, hangers specific for the parts to be shot blasted by customer.

SHOT BLASTING MACHINE HT 1.6 x 2.0 x 2.5 m

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- 1 **Frequency Converter**
For control of the ejection speed of the turbines, fitted into the switch cabinet incl. cooling device.

- 1 **Cartridge filter type P – 1**
For installation inside the workshop and exhaust of clean air back into the workshop.

The filter consists of a completely assembled housing made of steel plate with fitted in:

clean air side: ventures, compressed air pipes and reservoir with membranes and solenoid valves, maintenance door and clean air outlet.

dust loaded air side: filter elements with support structure, access door, dust loaded air inlet and air distributor plate, dust collector hopper with dust outlet, shimmy flap and bag claps, all mounted on steel tube feet.

A switch box with programme switch for setting the cleaning mechanism and pressure difference indicator, oil and water separator with pressure regulating valve.

Exhauster
with motor $P = 9,0 \text{ kW}$; $n = 3,000 \text{ Rpm}$.
fitted on the dust extractor.

- 1 **Maintenance platform** with ladder for the cartridge filter.

FILTER FOR INDUCTION FURNACES

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Technical data and specifications for filter for induction furnaces

Design data:

Make of furnace	not known
Number of furnaces	2
Flue gas capture	furnace hood
Material applied (composition)	scrap, returns
Quality	clean
Type of charging	Launder
Dirty gas take over point	inlet cyclone
Distance furnace – filter [m]	30
Max. negative pressure at take-over point [daPa]	150
Volume flow [Nm ³ /h hu.]	24,597
Volume flow [Am ³ /h]	30,000
Temperature [°C]	60
Type of dust	iron oxide, ash
Grain size	middle, fine
Characteristic	not abrasive, non-flammable, not explosive, nontoxic, not hygroscopic, sticky
Dust content [g/Nm ³]	< 5
Operating hours [h/a]	3,000
Place of erection	Inside a building

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FILTER FOR INDUCTION FURNACES

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Climatic conditions	Normal middle Europe
Height above sea level [m]	300
Net Voltage/frequency	400V/50Hz

Warranties

The specified volumetric flow rates and performance data are maintained with a tolerance range of 5%.

The warranty period commences with commissioning. If commissioning is delayed for reasons beyond our control, the deadline for warranty shall commence not more than three (3) months after delivery.

Material damage must be reported to us without delay and a reasonable period of time allowed for inspection and repair.

The warranty period for the plant as specified shall equal 12 months. Wear parts, as indicated in our spare parts list, shall be excluded.

The service life of filter bags shall be subject to a special warranty period of max. 2 years.

Emission Warranty

Residual dust in the clean gas: max. 5 mg/Nm³ in normal operation, measured according to VDI 2066

The officially required certification of clean gas values in the plant to be supplied can only be undertaken by an approved measuring institute. This must be ordered by the customer, who must also bear the associated costs. Prior to this measurement, which can normally only be undertaken at least four weeks after commissioning the plant, we must be granted sufficient time and opportunity to inspect the plant beforehand. If we do not receive your notification roughly two weeks before the date specified for the measurement, the costs of any renewed measurement which may be required shall be borne by you.

Requirements to be met for unrestricted validity of our warranties

- The plant must be operated in accordance with our operating and maintenance instructions.
- The plant must be operated within the framework of the specified design parameters.
- The plant must be commissioned by qualified specialist personnel.

FILTER FOR INDUCTION FURNACES

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Exclusion of warranty

- Mechanical damage to the filter bags and other components due to incorrect use.

Item	Qty.	Unit	Description
010	1	Ea	Cyclone-Pre-separator Type: NW 1800 for the separation of coarse particles and sparks, in fully welded sheet steel construction St 37, Sheet thickness (s) = 3 mm, (cone s = 4 mm) with inlet and outlet spiral, dip pipe, settling hopper, connecting flanges and support brackets for attachment to a support structure. inclusive support structure
020	1	Ea	Dust evacuation element Type: ø200/ø300 Weight-operated dual flap valve Housing in mild steel construction with inspection openings and connecting flanges Pendulum valves with counterweight
030	1	Ea	Holding device for BIG-BAG for double flap valve ø200/ø300 consisting of - mounting for BIG-BAG - transition piece with venting connection - bag connection piece

FILTER FOR INDUCTION FURNACES

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040 1 Ea Cassette-type filter

Type: FS722/2,25/315(315)

with energy saving cleaning air system operating under continuous dirty gas supply.

The cassette-type filter is delivered fully functional, with filter elements and installed cleaning system.

Housing in fully welded mild steel construction with separated dirty and clean gas compartments.

Inspection doors to allow easy access for maintenance and inspection work.

Cleaning system with radial cleaning air fan, cleaning air damper, moveable cleaning car and cleaning nozzle.

Connecting flanges for dirty gas inlet hood and dust collection hopper.

Technical data:

Designed for negative pressure up to:	600 daPa
Max./actual number of filter elements:	315/315 pcs.
Size of filter elements:	2,2
Filter medium:	Polyester oil rep. (8212-01/738)
Temperature resistant up to:	150 °C
Self ignition temperature:	> 485 °C
Overall installed filtering area:	473 m ²
Overall effective filtering area:	441 m ²

050 1 Ea Dirty gas inlet hood

arranged above the filter housing
in fully welded mild steel construction
with baffles for guiding the dirty gas flow,
inspection doors and connecting flange for the dirty gas ductwork

060 1 Ea Dust collecting hopper

arranged under the filter housing for the collection of the separated dust
in fully welded mild steel construction
with connection flanges to the filter housing and the screw conveyor

FILTER FOR INDUCTION FURNACES

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Support structure in structural steel construction

Height of support: 3.500 mm

070 **1** **Ea** **Screw conveyor**

arranged under the dust collecting hopper
for the conveyance of the separated dust
in mild steel construction
with connecting flanges to the dust collecting hopper and the evacuation
elements

inclusive gear motor

080 **1** **Ea** **Dust evacuation element**

Type: $\varnothing 200/\varnothing 300$

Motor-operated dual flap valve

Housing in mild steel construction
with inspection openings and connecting flanges
Pendulum valves with resetting springs
Gear motor

090 **1** **Ea** **Holding device for BIG-BAG**

for double flap valve $\varnothing 200/\varnothing 300$

consisting of
- mounting for BIG-BAG
- transition piece with venting connection
- bag connection piece

FILTER FOR INDUCTION FURNACES

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100 1 Ea Maintenance platform with ladder (1 level)

fitted in front of the filter inspection doors

In section steel construction with galvanised gridiron floor, complete with knee and handrail, vertical ladder 90° and one set of fastening materials.

Designed according to DIN EN ISO 14122-1 to 4

110 1 Set Fastening and sealing material

for filter plant installation

120 1 Ea Radial fan

Type: RGE063-063015-00

for the conveyance of the cleaned gas.

Type:

single-stage, one-sided suction, impeller mounted directly on the fan shaft, overhang type, with two bearings

Design:

Industrial fan in heavy-duty fully welded mild steel construction

Housing with cleaning opening and drain hole for condensate
Impeller with backwards inclined blades, electrodynamically balanced in two planes

Motor console for the drive motor

Driven by V-belt.

Technical data: (Design point)

Flow rate:	31.500 Am ³ /h
Total pressure at 20 °C:	618 daPa; 1,2 kg/m ³
Total pressure at 60 °C:	543 daPa
Power requirement at 20 °C:	67 kW; 1,2 kg/m ³
Power requirement at 60 °C:	61 kW
Impeller speed:	1,480 min ⁻¹
Height above sea level:	300 m
1 set elastic sleeves	

FILTER FOR INDUCTION FURNACES

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for suction and pressure joint, inclusive mounting clamps

1 set rubber-vibration absorbers
for a vibration-free erection of the fan, inclusive fastening plates

1 pc. insulation for fan housing
with mineral wool, $s = 100$ mm, cladding with structural aluminium

130 **1** **Ea** **Drive motor for radial fan**

according to IEC norm
with starting torque approx. 2.5
installed PTC resistor probes
designed for throttled cold start with star-delta starting

Motor output: 75 kW
Speed: 1500 min⁻¹

140 **1** **Ea** **Motor driven throttle damper**

Type: NW 900 x 710

mounted on the suction side of the radial fan
as a starting aid and for the control of the volume flow

Housing in fully welded mild steel construction
Multiple blades actuated via levers and connecting links
Actuating drive with limit switches and hand wheel

150 **1** **Ea** **Baffles silencer**

for the reduction of the outlet sound level of the main fan
to 85 dB(A) in 1 m from the outlet

FILTER FOR INDUCTION FURNACES

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170 1 Ea Surface treatment

The interior and exterior surfaces of the equipment are coated with a layer of 2 component-epoxy resin-prime coat, layer thickness at least 40 my. The exterior surfaces are supplementary treated with a top coat on an acryl basis, layer thickness at least 40 my.

Standard colour: RAL 9007 (grey aluminium)

Against supplementary charge special shades of colours are also available.

Other colours of the top coat to be notified within 2 weeks after contract.

Coating-gloss effect: 60 % with a measuring angle of 60°.

The application of different types of paint may cause colour variances.

If assembly is carried out by DAN THERM, professional touch up follows after accomplishment of site assembly.

Excluded from this surface treatment are parts in special steel, galvanised or insulated surfaces.

190 1 Ea Control and switchgear system

for the automatic operation of the dust collector.

The calculation of the control and switchgear system is based on the DAN THERM standard

Control cabinet

carried out conforming to VDE - regulations; (mild steel cabinet, system of protection: IP 55,) with power and control section, emergency-off mode, collective fault signal, hour counter, as well as wiring of devices in cable ducts. The control cabinet is designed with a minimum of fuses, completely wired on outlet clamps.

- PLC Type S7-300 / Make SIEMENS with compatible I/O units

The control cabinet includes further:

FILTER FOR INDUCTION FURNACES

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- 1 pc. main switch
- 1 pc. ammeter

as well as the following components:

- 1 pc. filter cleaning control
- 1 pc. differential pressure display for the filter
design: digital
- 1 pc. control of the main radial fan(s)
 - star-delta start-up
- 1 pc. screw conveyor control
- 1 pc. dual flap valve control
- 1 pc. control of the throttle valve
- 1 pc. negative pressure control in connection with
throttle valve
- 3 pc. control of the butterfly valve
- 1 pc. additive dosing control
- 1 pc. operation panel OP 7

All motors up to 5,5 kW are activated in the direct start-up mode; larger sized motors are activated by means of star-delta connection.

Operation of the plant

The control and display elements required for the operation of the plant are arranged in the control cabinet door

For the most important drives or drive groups single fault indication is planned
over indicator lights in the control cabinet door
In addition the control cabinet is equipped with a fault indication siren.

Signals for the interchange with other control systems will be made available by DANTHERM at a terminal strip.

FILTER FOR INDUCTION FURNACES

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200 1 Ea Cabling material

The cabling material between the plant and the switchboard cabinet has been calculated with a medium cable length of 30 m.

The cabling consists of:

- Cable (NYY-J and Ölflex)
- Cable glands
- Galvanised cable ducts without covering
- Galvanised rigid conduits
- Fastening material
- Accessories

Control cable and power cable will be installed in one cable tray separated by a dividing wall.

FILTER FOR DISA 130-A AND SAND PLANT

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Technical data and specification**Design data:**

Sand casting cooler:	DISACOOOL 2900 + shake-out system + sand plant
Max. negative pressure at take-over point [daPa]:	10
Volume flow [Nm ³ /h hu.]:	95,949
Volume flow [Am ³ /h]:	110,000
Temperature [°C]:	40
Characteristic:	abrasive, non-flammable, not explosive, nontoxic, not hygroscopic, not sticky
Unburned hydro carbons:	no
Operating hours [h/a]:	6,000
Place of erection:	Inside a building
Climatic conditions:	Normal middle Europe
Height above sea level [m]:	300
Net Voltage / frequency:	400V/50Hz

Warranties

The specified volumetric flow rates and performance data are maintained with a tolerance range of 5%.

The warranty period commences with commissioning. If commissioning is delayed for reasons beyond our control, the deadline for warranty shall commence not more than three (3) months after delivery.

Material damage must be reported to us without delay and a reasonable period of time allowed for inspection and repair.

The warranty period for the plant as specified shall equal 12 months. Wear parts, as indicated in our spare parts list, shall be excluded.

July 2008

FILTER FOR DISA 130-A AND SAND PLANT

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The service life of filter bags shall be subject to a special warranty period of 12 000 operating hours, but not more than 2 years.

Emission Warranty

Residual dust in the clean gas: max. 5 mg/Nm³ dry, measured according to VDI 2066

The officially required certification of clean-gas values in the plant to be supplied can only be undertaken by an approved measuring institute. This must be ordered by the customer, who must also bear the associated costs. Prior to this measurement, which can normally only be undertaken at least four weeks after commissioning the plant, we must be granted sufficient time and opportunity to inspect the plant beforehand. If we do not receive your notification roughly two weeks before the date specified for the measurement, the costs of any renewed measurement which may be required shall be borne by you.

The sound pressure level LAeq in the plant as defined by DIN 45635 – Part 1 equals max. 85 dB(A) at a distance of 1 metre. This value only applies under free-field conditions without reflection.

Requirements to be met for unrestricted validity of our warranties

- The plant must be operated in accordance with our operating and maintenance instructions.
- The plant must be operated within the framework of the specified design parameters.
- The plant must be commissioned by qualified specialist personnel.

Exclusion of warranty

- Mechanical damage to the filter bags and other components due to incorrect use.

FILTER FOR DISA 130-A AND SAND PLANT

Item	Qty.	Unit	Description																
010	1	Ea	<p>Cassette-type filter</p> <p>Type: FS722/5,75/805(805)</p> <p>with energy saving cleaning air system operating under continuous dirty gas supply.</p> <p>The cassette-type filter is delivered fully functional, with filter elements and installed cleaning system.</p> <p>Housing in fully welded mild steel construction with separated dirty and clean gas compartments.</p> <p>Inspection doors to allow easy access for maintenance and inspection work.</p> <p>Cleaning system with radial cleaning air fan, cleaning air damper, moveable cleaning car and cleaning nozzle.</p> <p>Connecting flanges for dirty gas inlet hood and dust collection hopper.</p> <p>Technical data:</p> <table> <tr> <td>Designed for negative pressure up to:</td> <td>600 daPa</td> </tr> <tr> <td>Max./actual number of filter elements:</td> <td>805/805 pcs.</td> </tr> <tr> <td>Size of filter elements:</td> <td>2,2</td> </tr> <tr> <td>Filter medium:</td> <td>Polyester fleece (8103-01/835)</td> </tr> <tr> <td>Temperature resistant up to:</td> <td>150 °C</td> </tr> <tr> <td>Self ignition temperature:</td> <td>> 485 °C</td> </tr> <tr> <td>Overall installed filtering area:</td> <td>1.208 m²</td> </tr> <tr> <td>Overall effective filtering area:</td> <td>1.145 m²</td> </tr> </table>	Designed for negative pressure up to:	600 daPa	Max./actual number of filter elements:	805/805 pcs.	Size of filter elements:	2,2	Filter medium:	Polyester fleece (8103-01/835)	Temperature resistant up to:	150 °C	Self ignition temperature:	> 485 °C	Overall installed filtering area:	1.208 m ²	Overall effective filtering area:	1.145 m ²
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FILTER FOR DISA 130-A AND SAND PLANT

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030 **1** **Ea** **Dust collecting hopper**

arranged under the filter housing for the collection of the separated dust
in fully welded mild steel construction
with connection flanges to the filter housing and the screw conveyor

Support structure in structural steel construction

Height of support: 3.500 mm

040 **1** **Ea** **Screw conveyor**

arranged under the dust collecting hopper
for the conveyance of the separated dust
in mild steel construction
with connecting flanges to the dust collecting hopper and the evacuation
elements

inclusive gear motor

050 **1** **Ea** **Dust evacuation element**

Type: $\varnothing 200/\varnothing 300$

Weight-operated dual flap valve

Housing in mild steel construction
with inspection openings and connecting flanges
Pendulum valves with counterweight

060 **1** **Ea** **Holding device for BIG-BAG**

for double flap valve $\varnothing 200/\varnothing 300$

consisting of
- mounting for BIG-BAG
- transition piece with venting connection
- bag connection piece

FILTER FOR DISA 130-A AND SAND PLANT

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070 **1** **Ea** **Maintenance platform with ladder (1 level)**

fitted in front of the filter inspection doors

In section steel construction with galvanised gridiron floor, complete with knee and handrail, vertical ladder 90° and one set of fastening materials.

Designed according to DIN EN ISO 14122-1 to 4

080 **1** **Ea** **Thermal insulation**

of the exterior surfaces with:

Mineral wool mats $s = 60$ mm

Density 50 kg/m^3

Cladding made of structural aluminium plate, $s = 1$ mm

- insulation of the filter housing, hood, collecting hopper and screw conveyor

090 **1** **Set** **Fastening and sealing material**

for filter plant installation