
Technical Terms of Delivery

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Preamble

The existing provisions for the delivery of machines, plants and facilities are defined in these technical terms of delivery which apply for the company J. Rettenmaier & Söhne and its subsidiaries (hereafter known as JRS).

The main contractor and all subcontractors must meet the general, commercial terms of delivery for the procurement of machines and facilities for JRS.

Any deviations from the technical specifications in this document can be authorised where necessary. They must be coordinated with the relevant JRS project engineer in writing with copies going to the purchasing department.

For individual locations, plant-specific requirements may apply.

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1 General requirements

1.1 Offer

1.1.1 General

Price enquiries are prepared by the JRS project engineer and forwarded to possible contractors/suppliers. The JRS project engineer prepares the relevant process and machine specifications which are specific to the plants and/or machines to be delivered.

All offers are to be submitted in writing to the JRS project engineer making reference to the enquiry.

1.1.2 Basic contents of the offer

The entire plant must conform to the general delivery specification. The offer must contain the following declaration:

We expressly agree to recognise and acknowledge the JRS general delivery specification for machines, plants and facilities.

If this declaration cannot be made, the contractor must indicate the deviations in detail in writing in the offer. Orders/modifications are only considered confirmed if the responsible JRS project engineer or his/her immediate supervisor expressly agrees to the deviations applied for in writing.

The offer must at least have the following information:

- Project no. or cost centre no. (assigned by project engineer)
- Name of the JRS project engineer who prepared the enquiry.
- Offer no. of the supplier and date
- Binding delivery deadline from receipt of order
- Special requirements (e.g. for the building, foundation, etc.)
- Establishment of services or deliveries to be provided by customer

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1.1.3 Individual prices

In the offer, the following positions are to be identified separately:

- Basic price for the machine, plant or facility
- Option for special additional equipment
- Spare parts package, based on the recommended spare parts list
- Assembly services (daily rate, hourly rate, expenses extra)
- Commissioning and training costs (daily rate, hourly rate, expenses extra)
- Packaging costs insofar as they can be separately identified
- Dispatch costs incl. transportation insurance free factory/plant
- Guarantee conditions taking the JRS terms of purchase into account
- Option prices for additional equipment where required

1.1.4 End of the offer preparation

After the end of the offer processing, all of the drawings, documents and parts provided by JRS must be returned in their entirety.

1.1.5 Orders and changes in the order scope

Orders as well as additions and/or changes in order are only to be prepared by the JRS purchasing department. Purchase intention declarations and changes of orders already accepted are only valid if they are submitted by the JRS purchasing department.

If there are changes in a current order with impact on the costs, the contractor of the machine, plant or facility must submit a written offer to the JRS project engineer. In the offer, any impacts on the prices or delivery deadlines must be presented.

After a successful examination and approval of the suggested changes by the JRS project engineer, the JRS purchasing department will prepare a reorder or an order change.

The acknowledgement of an order must be received as soon as possible by the purchasing department with a copy to the JRS project engineer. The order acknowledgement which accompanies the order must be signed by the contractor and returned no later than 3 weeks after receipt of order.

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1.1.6 Work to be done by the supplier at the customer's premises

With any service, assembly or commissioning work associated with the delivery of a machine, plant or facility, the contractor is obligated to comply with the plant-specific safety and administrative regulations. The information must be acknowledged through a signature of the responsible employee.

With delivery and assembly, the contractor must ensure through the corresponding supervision that the machine, plant and/or facility is properly set up. Welding, separation and soldering work is always forbidden insofar as no work permit has been given by a responsible JRS employee. The work permit is always to be done exclusively in writing.

1.2 Safety regulations

The machines, plants and facilities must correspond to the requirements with regard to occupational health and safety in the current valid version. All binding standards are to be complied with and understood as minimum requirements. It is the responsibility of the contractor to comply with the respective valid version of the laws, ordinances and standards.

1.3 Documentation

The entire documentation for the machine, plant and/or a facility must be done in German. This also expressly applies to all signs attached to the machine. With deliveries in foreign plants, the documentation is to be done in the country's official language or in English (to be determined by the JRS project engineer).

An updated complete set of documents in hardcopy as well as a copy in digital form on CD-ROM (data format PDF or WORD) is to be submitted to the JRS project engineer at the delivery or no later than five work days before the commissioning.

The following documents are always to be submitted in this process if necessary:

- General operating instructions
- Maintenance handbook
- Overview drawing of the machine, plant and/or a facility
- Electrical circuit diagram with parts lists
- Pneumatic circuit diagram with parts lists
- Hydraulic circuit diagram with parts lists
- Spare parts and fastening parts diagrams with parts lists
- PLC programme with program printouts (process control system)
- Functional plans

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- Data carrier with the control software including the source code
- Flow charts and sequential function chart
- Spare parts lists with original manufacturer name and original order no.
- Risk analyses
- Documentation of the individual components

After commissioning and final acceptance of the machine, plant and/or facility, the documents mentioned above are to be completely updated within 30 days and sent to the JRS project engineer as 2 hardcopies as well as in digital form on a CD-ROM (1).

1.4 Shipping instructions

With delivery free factory/plant, all parts must be adequately secured, packaged and labelled. With deliveries of the machine, plant and/or facility from the place of dispatch (FOB), the following shipping instructions must be complied with:

- JRS is to be notified by the contractor at least one week before dispatch with regard to information on weight, dimensions and the anticipated number and type of containers or trucks.
- All deliveries and separate partial deliveries are to be clearly labelled with the JRS project no. and/or order no.
- The forwarder or the handling staff is to be informed of any special transportation instructions and/or loading or unloading instructions and/or the instructions are to be attached easily recognisable to the delivery goods.

JRS will charge the contractor for any freight or consequential costs which result from violations in the dispatch instructions.

If due to a delayed delivery, an air transport is required, the contractor must bear the necessary added costs in advance.

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2 Special requirements in the area of mechanical engineering

With the delivery of machines, plants and/or facilities, the respective current regulations and standards are to be complied with. Any deviations of the following listed specifications in quality or execution may only be done after express written permission from the JRS planning engineer.

If you have any questions, please contact Mr. Paul Köder
phone +49 (0) 7967/152 233 fax +49 (0) 7967/152 500 233 or Paul.Koeder@jrs.de.

2.1 Drawing instructions

The entire documentation for the delivered machine, plant and/or facility, including the remarks on drawings and parts lists must be carried out in German. With deliveries to foreign plants, the documentation is to be done in English (to be determined by the JRS project engineer).

Information must correspond to the international system of units (SI). For the entire documentation, a JRS project no. is to be listed in the label field. You will receive this number from the responsible JRS project engineer.

CAD drawings are to be done in the format AutoCad (dwg and/or dxf). The graphic representation of machines, plants and/or facilities must be made up of:

- A general drawing (machine images or set up plan for several machines) which represents the final state of the machine, plants and/or facility to scale. The drawing must have at least two views-top view and side view.
- Drawing of the assembly groups and subassembly groups are to be assigned a position no. which is developed from the general drawing.
- Detailed drawings for spare and wear parts:
The detailed drawings including all drawings of the spare and wear parts must contain all measurements and tolerance information as well as material, surface and heating treatment information which is required for the manufacture of parts.
- Parts lists:
For all machines and assembly group drawings, parts lists are to be prepared.

For purchased parts the parts lists must contain the original part number (order no.) as well as the names of the manufacturers or suppliers.

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Release of the design by the customer:

Before the production start, the design must be submitted to and approved by the respective JRS project engineer.

With delivery of individual parts according to JRS drawings with increased quality requirements, test protocols according to EN 10204-3.1B are to be attached which verify the required quality with regard to hardness, surface quality and dimensional accuracy (tolerances). With deliveries of complete assembly groups, this also applies for the parts which are labelled correspondingly on the individual parts drawing.

Drawing remarks: Test protocols according to EN10204-3.1B (Material certificate, dimensional accuracy, surface quality and hardness) are to be provided.

2.2 Drive

The following named brands are **preferably** to be used with drives. Deviations must be granted in writing by the JRS project engineer.

All electric motor drives of a machine having a switching rate ≤ 10 switching operation per hour as well as a duty cycle of $> 80\%$, are to be supplied in IE 2 (IE3) quality.

Drive type:	Manufacturer:	Model:
Example		
General drive motor	SEW, Nord and Siemens	For shaft mounted motors TORQ LOCK must be chosen as shaft-hub connection

All conventional motors and drive motors are always to be planned in an upright position if possible.

2.3 Power transmission elements

Drive type:	Manufacturer:	Model:
Example		
V-belt pulleys	Samiflex	Shaft-hub connection only with Taperlock
Clutches	Rexnord	Type OMEGA, Rupex
Fan belts /V-belts	Optibelt	Red Power or comparable quality
Chains	IWIS	

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2.4 Bearings and bearing housings

Bearing type:	Manufacturer:	Model:
	SKF, FAG, INA, NTN-SNR	Preferably clamp ring bearing

The bearing must be designed for a service life of at least 80,000 operating hours.

2.5 Lubricant technology

All bearing zones of a machine which are not equipped with a lifetime lubrication and thus must be lubricated in specific intervals, are supposed to have lubricating pipes running to them which run together at a central point (after consultation with JRS project engineer).

2.6 Screw/bolt connections

All screws and bolts must be executed at a quality of at least 8.8 galvanised and secured with Schnorr locking washers. Dynamically stressed connections must be galvanised at a quality of at least 10.9 and secured with Schnorr locking washers or better with NORD LOCK and with straight conduits, secured additionally with a self-locking nut.

In addition to the general requirements, the special delivery specifications for components must be taken into account.

2.7 Construction of welding seams

- Welding seams may not be sanded/polished
- Welded parts of VA must be glass bead-blasted and acid-cleaned
- Larger welded parts must be low-stressed annealed

2.8 Surface treatment

All components made of standard steel are to be galvanised or painted depending on the requirements (in consultation with the project engineer).

Components which are painted must be blasted, primed and then painted with a finish coat. Type of RAL tones in consultation with the respective project engineer.



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2.9 Labelling of machine components

All machine components which are produced according to JRS drawings are to be labelled permanently with the drawing number.

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3 General requirements in the area of pneumatics and hydraulics

With the delivery of machines, plant and/or facilities with electrical equipment, the respective, current regulations and standards are to be complied with. Any deviations to the following specifications in quality or execution may only be done after express written authorisation by the JRS planning engineer.

If you have any questions, please contact Mr. Otto Dolzer
phone +49 (0) 7967/152 133 fax +49 (0) 7967/152 605 or Otto.Dolzer@JRS.de.

3.1 Pneumatics

The pneumatic cycles must be designed that they work at an operating pressure of 4.8-5.2 bar. The standard pressure in the JRS plants is up to 5.2 bar gauge pressure. The use of boosters for pressure increases is generally not allowed. The control voltage for pneumatic magnet valves is always 24 V (DC) direct current.

All types of pneumatic control systems require the approval of the JRS project engineer. The use of purely pneumatic controls is not allowed. Electrical control systems are generally to be used.

3.1.1 Safety

Complex machines, plants and/or facilities with compressed air supply have to be equipped with a maintenance device combination composed of:

- On-off valve
- Filter regulator valve with manometer
- (Oiler) upon request
- On-off valve with solenoid 24 V (DC)
- Soft start valve
- Branching module with pressure switch
- Mounting bracket
- Flow sensor

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With this maintenance device combination, the total compressed air supply of the machine, plant and/or facility must be able to be switched off completely. The pneumatics system has to be designed that no hazards arise by switching on or off or a failure and the resumption of power supply.

All air pressure tanks and surge tanks are to be produced and labelled according to the current valid regulations.

If with an exceeding of the operating pressure, hazardous situations and/or damage can occur, overpressure and vacuum safety equipment secured against misuse must be installed.

3.1.2 Plant components

In the JRS plants, preferably components from the manufacturer Festo are used.

3.2 Hydraulics

3.2.1 Oil container

The **container** must be able to hold the entire oil volume existent in the system. For heat dissipation and air elimination, the container must be as large as possible. In addition to the calculated nominal size an air cushion of 10% to 15% has to be scheduled which can take up fluctuations of the oil level, etc. The container must be designed with lateral cleaning openings (manholes).

For the **removal** of ageing products or contamination, the container floor must be sloped and at the deepest point there should be a discharge valve.

Suction and return pipelines must be separated from each other. Both pipelines end well below the lowest oil level. In order to avoid the suction or stirring up of the sediment, however, a distance of 2 to 3 times the pipe diameter should be maintained to the floor. Dust and return pipelines are to be tapered at their ends. The recommended flow velocities of approx. 1-2 m/s are also to be taken into account in the dimensioning.

Suction and return areas must be separated with a metal sheet which is placed directly on the floor and is as high as the oil level.

Container cover

The design is dependent on the superstructure. If the pump, for example, is installed below the oil level, the pump cover must be separated from the container cover. When installing drive groups, the cover is to be designed stable and free of vibration.

When installing controllers, a leakage oil rim/lip is to be provided.

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Cleaning openings

All containers have to be equipped with laterally aligned cleaning openings (manholes) through which all parts of the container must be able to be reached and cleaned.

Filler plug/ventilation filters

Filling of the oil container is to be done using a filler screen or even better using a special filter aggregate. For this purpose, a pluggable G ½ "IT screw connection with pipelines right up to the container floor is to be installed into the cover. Also in the return areas, a pluggable G ½ "IT screw connection with pipelines right up to the container floor is to be installed. Fill level pipes or oil level gauges as well as electric float switches. Fill level indicators are to be installed impact and vibration-proof within the assembly.

Clearance height

For better cooling as well as to simplify oil discharge and transportation, an adequate floor space of 150 mm is to be provided.

3.2.2 Cooling, heating, filtering

These auxiliary devices are to be provided optionally if they are not already part of the plant.

3.2.3 Filters

The oil transported from the pump or pumps must be processed through a pressure filter before it arrives at the valves. The filter unit must meet the requirements of the valves.

3.2.4 Pipelines

The connection of the pipelines of the assembly to the machine must be done by skilled hydraulic technicians. All pipes must be assembled carefully, precisely and with zero tension corresponding to the assembly regulations of the connection manufacturer. The pipes used must be held by exactly fitted mounting clips which do not exert any unnecessary pressure load. The pipelines must be as short and straight as possible.

The use of unneeded angles and elbows has to be avoided. If possible pipe elbows or on suitable machines bent pipes are to be used.

The number of threaded connections must be kept as low as possible.

The internal cross-sections of the pipes are to be selected in such a way that the flow and pressure losses are minimised. Hoses are to be used for vibration damping and muffling of noises in the connection of spatially unfavourable or moving connections. The pressure levels and nominal diameters according to manufacturer's instructions are relevant to the selection. During the installation



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of hose lines, bending radii, movement clearance, etc. are to be observed. Exclusive use coded hoses from Hansaflex or Pirtek.

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4 Special requirements in the area of electrical engineering

With the delivery of machines, plants and/or facilities with electrical equipment, the respective current regulations and standards are to be complied with. Deviations in quality and execution to the following listed specifications may only be done after express permission in writing by the JRS planning engineer.

If you have any questions, please contact Mr. Markus Hauber
phone +49 (0) 7967/152 253 fax +49 (0) 7967/152 248 or Markus.Hauber@JRS.de

4.1 Special requirements

4.1.1 Electrical circuit diagrams and documentation

- The file name for each circuit diagram is to be coordinated with JRS and retained if there are changes.
- All electrical circuit diagrams shall be created, as far as possible, using the systems Engineering Base by Aucotec or AutoCAD. Alternately, if another system is used to create circuit diagrams, it is mandatory to provide DXF files.
- The circuit diagram must in any event also be available as a PDF file.
- All circuit diagram documents must be supplied in German, on A4 paper as well as all electronic data on DC or DVD. With deliveries to the foreign plants, the documentation is to be done in the language of the country or in English (to be determined by the JRS project engineer).
- For all machines, plants, and/or facilities with electronic control, a functional plan must be available.
- All equipment used must be documented in parts lists providing manufacturer's designation, article number and distinct equipment designation.

4.1.2 Safety

- If a power failure occurs no matter what the reason (pneumatic/hydraulic/electrical), it must be guaranteed that there is no hazard to employees.
- Damage to the machine, plant and/or facility as well as the product being processed must be excluded.

When the power supply returns, there must not be an automatic restart of the equipment. The safety standards EN ISO 13849-1 and EN IEC 62061 are to be complied with.

4.1.3 Manual operation

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- For maintenance, repair and adjustment work, manual operation must be available.
- Manual operation is to be interlocked in such a way that any damage to the machine is impossible.
- During manual operation, it must be possible to place the machine in the „basic position“

4.1.4 Errors and diagnoses

- Errors are to be displayed in the respective native language and, if possible, with a diagnostics and advice.

4.1.5 Control parameters

- The control must, if applicable, be designed in such as way that the adjustment parameters can be protected with passwords.

4.1.6 Housings/control cabinets

- All housing and control cabinets and components used must meet the current valid VDE and DIN specifications.
- The control cabinets are to be supplied in the colour RAL7035.
- Generally a space capacity of at least 25% is to be provided.
- During the design and execution, it should be ensured that operation at an ambient temperature of up to -10°C must be possible.
- A corresponding regulated control cabinet heating is to be provided.

4.1.7 Control cabinet layout

- Transformers and power supply units must always have an additional power reserve of 30%.
- In the control circuits, electronically-switched power supplies must be used.
- Devices are to be arranged in such a way that the warming and influence on nearby components remains in limits. The plants are to be designed in such a way that the function is still ensured even at a ambient temperature of +40°C.
- In switchgears it must be observed that the lost heat which is caused by the electrical equipment is well dissipated.
- Each control cabinet which is equipped with frequency converters must have filter ventilation and the associated exit filter.
- Protection class: according to IP 54 when setting up in or next to the plant and in closed switched rooms.
- Cabinets and spaces must offer reasonable protection against environmental effects.
- Devices are to be arranged in such as way that all devices and connection faces are easily accessible when the door is opened.
- The cable inlet must always be placed below.

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- Housings and control cabinets with a volume of more than 0.5 m³ must have interior lighting which is switched on via an integrated sensor.
- At least one cabinet light is to be supplied per cabinet or with cabinets which are mounted together, per section.
- In each control cabinet, where components possibly are to be parameterised or monitored with a laptop, there is a power socket (230 V, AC), type CEE 7/7. All power sockets in the control cabinet must be secured collectively with a RCD (FI circuit breaker 30mA) and a 6A line circuit breaker.
- Cabinets which are not for wall mounting or housed in closed switch rooms are to be provided with a base having a minimum height of 100 mm.
- All components are to be permanently labelled according to the corresponding circuit diagram.
- The device labelling or sign must be mounted so that it is easy to see.
- Each control cabinet must be clearly and unmistakably labelled on the outside.

4.1.8 Control cabinet wiring/wiring guidelines at JRS

Colour:	Use:
Red	Control circuits (alternating current)
Dark blue	Control circuits (direct current)
Black	Main circuit (load circuit)
Orange	Interlocking circuits (Circuits before main switch)
Light blue	Neutral conductor (if present)
Green/yellow	Protective ground wire
Brown	Signal line

4.1.8.1 Installation

- Power, control, bus lines are to be run separated from each other using separating web or a shield tube and must meet the current valid VDE and DIN regulations.
- In all cable routings, a power reserve of at least 25% must be available.
- All lines are to be labelled on both sides corresponding to the circuit diagram. With several overlapping controls, a mix-up must be avoided.
- Weather-resistant signs for the labelling of the cables are to be used.
- All external plant components are to be labelled according to the corresponding circuit diagram.
- Routing materials are to be supplied in a corrosion-resistant, metallic version, incl. all mounting elements for cable placement/fastening.
- All cable trays are to be chosen in a closed version.
- With horizontal routing, cable trays are to be used; with vertical routing, always use riser conduits.
- Corners and edges within the cable lines are to be supplied with edge protection in order to protect the lines.
- Cable line routing after consultation.

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- With all the cable feed-throughs created through the installation in wall and ceilings, expert fire insulation is to be produced.
- The standard „safety of machinery“ electrical equipment of machines-Part 1 DIN EN 60204-1 (VDE 0113-1) is to be complied with.
- Special attention should be applied to the regulations for „protection against fire where risks of fire exist“ VDE 0100-482

4.1.8.2 Earthing and EMC

- The lines must run from connection to connection without interruption.
- Cable lines are to be earthed without exception. The central grounding point will be provided by the customer.
- All cable glands are to be used as plastic or EMC screw connections according to their function.
- All EMC guidelines must be observed accordingly.
- The following VDE guidelines are to be observed:
 - o DIN VDE 0100 part 410: Erection of power installations with rated voltages below 1000 V, part 4; protective measures, chapter 41: protection against electrical shock.
 - o DIN VDE 0100 part 444: Electrical installations in buildings, protection for safety, protections against voltage disturbances and electromagnetic disturbances (EMI) in installations in buildings.
 - o DIN VDE 01000-540 Erection of power installations with rated voltages below 1000 V
 - Selection and erection of electrical equipment – earthing arrangements, equipotential bounding conductors.
 - o DIN VDE 0151: Material and minimum dimensions of earth electrodes with respect to corrosion.
 - o DIN VDE 800-2-310: Application of equipotential bonding and earthing in buildings with information technology equipment.

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4.1.8.3 Sensors

- All sensors must be used with 24 V DC nominal voltage. This voltage is to be generated by the customer with cyclical power supplies.
- All sensors must be designed to be plug-in. Plugs or couplings of size M12x1 with the appropriate connection cables are to be used. **This does not apply to safety engineering and ATEX area.**
- Roller belts must either be equipped with contact rollers with inductive proximity switches or with optical sensors (no light barriers).
- If for technical reasons, a light barrier must be installed, this must be provided with a stable mechanical protection.

4.1.8.4 Wireless connections and networks

- Wireless connections such as WLAN, Bluetooth or similar may only be used after consultation with the customer.
- Ethernet TCP/IP – addresses are to be coordinated with JRS beforehand.

4.2 Machines, plants and components

In the following section, the components to be used will be specified. Deviations are basically possible but must be authorised by the responsible JRS project engineer in writing.

4.2.1 General

- In order to achieve uniformity in the brands and types of components, the purchaser reserves the right to select the types.

4.2.2 Supply voltage

In the German JRS plants, the following applies:

- For motors < 11 kW 380/400 V AC/50 Hz
- For motors > = 11 KW 690 V AC/50 Hz
- For control voltage, 24 V direct current (DC) is always to be used.

In the foreign plants, the usual primary voltages used in the country are to be taken into account. Information on this can be obtained from the JRS project engineer.

For control voltage, 24 V direct current (DC) is always to be used.

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4.2.3 Preferred Electrical components

Parts:	Company:
Control cabinets	Rittal
Power contactors	Siemens Sirius
Thermistor motor protection	Siemens 3RN20131BA30
Contactors and auxiliary relays,	Siemens Sirius
Time relays, wiper relays	Schiele / ABB
Switches, step switches, indicator lights, emergency stop, illuminated keys, etc.	Schneider Electric Harmony Style 5
Circuit breakers up to 7.5 KW Circuit breakers from 11 KW Only 3 pole circuit breakers are to be used.	Siemens Sirius Schneider Electric NSX
Circuit breakers	ABL Sursum / ABB
Auxiliary relays	Phoenix Contact / Finder
Serial terminals	Phoenix Contact ST, STI
Disconnectors	Schneider Electric Compact NS
Level sensors	Rotary paddle detector, UWT (ATEX) Vibration limit switch, E+H
Light barriers	Sick
Inductive or capacitive proximity switches	IFM-Electronic / Schneider Electric 24V DC
Frequency converter up to 45KW as 3 x 400 V Frequency converter from 55KW as 3 x 690 V (if this voltage exists, clarification with customer necessary)	SEW Eurodrive – Movitrac B or Allen Bradley PF 753
Process measurement (pressure, flow, etc.)	Endress & Hauser with HART protocol or 4-20mA
Safety relays (emergency stops, light grids, safety doors)	Siemens Type 3SK or Pilz PNOZ
Safety controls	Pilz PNOZ-Multi, PSS4000, Rockwell Guard-Logix, Compact Guard
Decentralized I/O systems for control cabinets according to type of control	Siemens ET200SP Rockwell 1734-Point I/O

4.2.4 Technical information

- | | |
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| <ul style="list-style-type: none"> - Rotating field of the work network: - Medium voltage of the work network: - Low voltage of the work network: - Single phase alternating current of the work network: | <p>Clockwise rotating field
Rotary current 20kV, 50Hz
Rotary current 400V/690V (AC), 50Hz.

230V (AC), 50Hz.</p> |
|---|--|

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4.2.5 Drives

- All drives must correspond at least to the insulation category „F“.
- Drives from 11 kW, must be operational with a voltage of 690 V (AC).
- For drives from 11 kW **without load-dependent control**, one PTC thermistor loop (150°C) is to be supplied for each winding.
- For drives from 55 kW **with load-dependent control**, one PTC thermistor loop (150°C) is to be supplied for each winding as well as an additional PT100 probe for the winding temperature.
- The lines (strands) for drive control (thermistor, PT100) must be sufficiently long, so that they may be wired to a separate terminal box provided on site.
- Drives which are operated with frequency converters are always to be equipped with one PTC thermistor (150°C) and must meet the requirements for operation on a converter. If the drive is operated at below 25 Hz, forced ventilation is always to be supplied. Threshold value class B according to EN55022 is to be complied with!

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5 Special requirements in the area of automation

5.1 General

5.1.1 Guidelines

- Only the systems Siemens S7 and Rockwell Logix family may be used as PLC system. Other PLC systems are not allowed.
- The **file or project name is to be coordinated with JRS** and retained in case of changes.
- The complete programme documentation **must be in German**.
- All Programmes must be supplied with (network comments, cross-reference lists, hardware configuration files and manufacturer-specific files, etc.).
- Setup data for programmable devices such as frequency converters, servo drives, measuring instruments must be provided together with the respective programming platform without fail.
- Before transmission programme documentation in other languages must be translated into German including cleartext displays and other display units.
- Programmes must be completely stored on CD's or DVD's and submitted at the acceptance test.
- The entire programme **may not be password-protected or have any other encoding**, i.e., there must be complete readability of and the possibility to modify all modules necessary to secure function. Modules purchased from external manufacturers and equipped with know-how protection are excluded.
- Programmes must be stored **power-failure safe** in the CPU.
- **All conditions which lead to production stops, programme interruptions or a switching off of the machine must be displayed exactly defined so that repairs are also possible without a programming device (e.g. cleartext display "switch Sxx.x not started up")**.
- When using network technology, the **IP addresses are specified exclusively by JRS** and are to be requested before the commissioning or delivery.
- If remote control is intended at a later date, this must be applied for before delivery of the machine.

5.1.2 System Siemens S7

5.1.2.1 System Siemens-control type depending on the application case

- **S7-300** (only with CPU 312C, 313C, 314C 2DP, 315-2DP, 316-2DP, 318-2DP)
- **S7-400** (with CPU412-2DP, 414-2DP, 416-2DP)
- **S7-1500** (all CPUs)
- **The use of other types is only allowed after consultation and express written permission**

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- When using the CPU interface for other device components over MPI (e.g. other controls, control panels, etc.) these are to be connected with a double plug (e.g. Siemens 6ES7 972-0BB41-0Xa0) to the CPU so that there is a connection possibility for programming.
- For networking of controllers Ethernet / Profinet is recommended. Profibus is not desirable.

5.1.2.2 System Siemens-Operation and monitoring

- Operator and monitoring panels must be made Siemens.
- Currently available Appliances of Siemens must be used, approved by JRS.
- Connection via Profibus, MPI or Ethernet.
- Colour display types are preferred
- Programming only with current software by Siemens, all necessary files and licenses have to be supplied.

5.1.2.3 System Siemens-Decentralised peripherals

- For connection of the individual components via Profinet the corresponding configuration files must be available on a data medium to be submitted. A connection via Profibus DP is not desirable.

5.1.2.4 System Siemens-Decentralised guidelines

- Programming must be done in Siemens Step 7, latest version of TIA portal or S7 for Windows (IBH-Softec) and be 100% compatible with Siemens.
- All Step 7 guidelines are to be complied with. Feasibility of AWL, FUP, KOP if practical and technically possible.
- **All operands** are to be listed in the symbolism files with symbol names (without umlauts max. 24 characters) and comments (max. 80 characters).
- Data bits, data bytes, data items and data double words, etc. are to be documented in the corresponding data modules in the variable tables with the symbol names and comments.
- When using instance data modules, the same numbers are to be assigned, e.g. FB 100 → DB 100.
- Functional modules are only to be programmed using local data which must be documented accordingly.
- Each module must be provided with a description, library number, name, family, author, version.
- Plant components (e.g. drives, plant parts, etc.) are to be programmed with the associated sensors and actuators together in a module.
- The modules may not have more than 1000 instructions/statements.

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5.1.3 System Rockwell

5.1.3.1 System Rockwell-Control type depending on application case

- Compact Logix CPU 1769-L32E, L35E, L43, L45 from Firmware V20
- Compact Guard CPU 1768-L43S, L45S from Firmware V20
- Control Logix CPU 1756-L71, L72, L73, L74, L75 from Firmware V20
- Guard-Logix CPU 1756-L71S, L72S, 1756-L73S, from Firmware V20
- Control Logix CPU 1756-L81E, L82E, L83E, L84E, L85E from Firmware V31
- Control Logix CPU 1756-L81ES, L82ES, L83ES, L84ES from Firmware V31
- Use of other types only after consultation and written approval

5.1.3.2 System Rockwell-Operation and Monitoring

- PanelView version depending on notation
- Connection over Ethernet IP
- Coloured representation is preferred
- Programming with PanelBuilder32 or RSVIEW, all required files and licenses are to be supplied.
- With large plants and superordinate process control system, the "Intouch" system by Wonderware in the latest updated version at the time of the order placement is to be used as the visualisation interface. All required files and licenses are to be supplied.
- When using a visualisation in a Controllogix, a second 1756 ENBT or 1756EN2T is always to be built in order to guarantee a separation of the IO-area from the usual network because this will be set to our company network.

5.1.3.3 System Rockwell-Decentralised peripherals

- Connection over the individual components with 1756 ENBT and 1734-AENT-Point-IO using Ethernet IP, all associated configuration files must be available on data medium which is to be submitted.
- A separate Ethernet IP is always to be set up for the IO area via a configurable switch (IGMP snooping) when HMI and IO cannot be set up with separate networks.

5.1.3.4 System Rockwell-Special guidelines

- Programming must be done exclusively with RSLogix 5000 V20 or Studio5000 V31 or higher.
- All RSLogix guidelines are to be complied with.
- All variables are to be documented with clear symbol names and comments.



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- Functional modules which are used several times in the programme are to be programmed exclusively as add-on instruction with local variables which are to be documented accordingly.
- Each add-on instruction must be supplied with a description, name, author, version.
- The complete programmes as well as all sub programmes must be sensibly structured so that plant parts can be hidden/masked at any time.
- Plant components (e.g. drives, plant parts, etc.) are to be cohesively programmed with the associated sensors and actuators in a routine insofar as it is sensible and not time-critical (plant part programme).
- A continuous task must be avoided.
- The programme should be optimised so that cycle times are as short as possible.