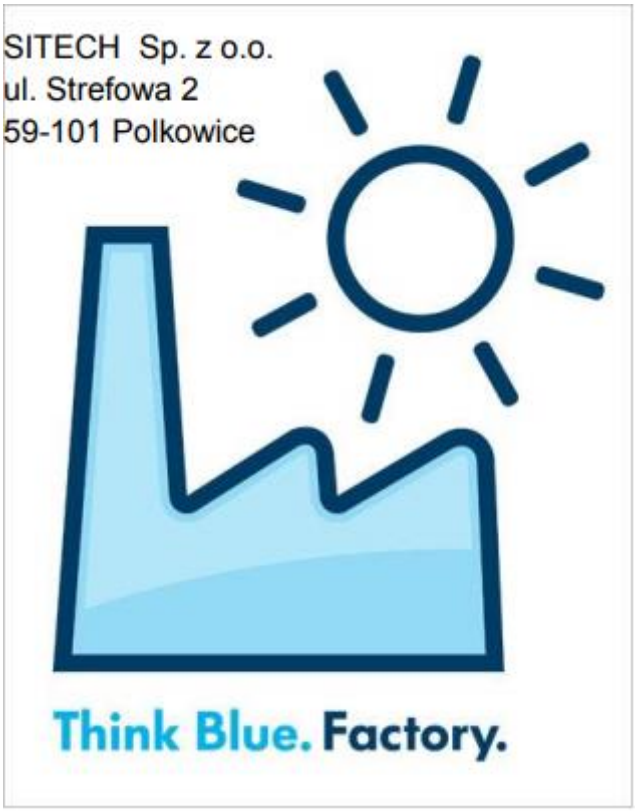

Energy requirements specification

Prepared by:	Approved by:
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1. General part

1.1. Introduction

This List of Supplies and Works is to be considered as a supplement to the Technical Requirements Specification. It describes only the scope of deliveries of electrotechnical devices - the overview for the SITECH Polkowice area and the branch in Głogów.

Before submitting an offer, consultation with persons included in the general Technical Specification of the contract is necessary. The date of these consultations should be agreed upon in due time.

The choice of the Contractor will also take into account the use of energy consumption by the machine / process and the technology used, which has a significant impact on SITECH's energy efficiency.

The contractor will use (consume) the media provided by SITECH in a rational manner.

1.2. Regulation

With respect to electrical equipment and control devices of this document, the following must be obeyed:

- European Community Directive on CE machinery
- DIN / VDE regulations
- technical standards EN, VDI, DIN / ISO
- laws on technical means of production
- workplace regulations
- accident prevention regulations
- environmental protection law and specific regulations, which must be met separately for electrical projects:
- guidelines for wiring diagrams
- catalogue of requirements for transport equipment
- requirements for industrial computers
- industrial network diagnostics
- Directive 6E (electrotechnical equipment of machines, installations, and devices)
- Directive 10E

The scope of delivery includes the European Community Declaration of Conformity, CE marking, operating instructions with hazard analysis and complete documentation. The contractor is obliged to check whether there is a need to initiate proceedings in order to obtain relevant permits in accordance with currently applicable environmental law. If the supplier intends to select performance variants that are contrary to VW's regulations on the means of production, then the contractor is obliged to obtain a special permit in writing for such deviations. This arrangement is necessary to standardize the equipment of the devices and applies only to a specific project.

All electrical equipment must comply with the strict conditions that exist in the automotive industry. Oily air and increased dust might be expected, therefore appropriate measures must be taken to ensure safe operation.

All components used must be made at least to the industry standard, and the use of office communications components requires prior agreement with the Planning and Technology Development Department and Central Maintenance.

All components used must comply with EN 50081-2 (Interference emission limits for electrical equipment in an industrial environment).

The use of used materials that may affect the electrical availability of the device is only permitted with the written consent of the Planning and Technology Development Department and Central Maintenance.

1.3. Offer overview

Electrical equipment must be agreed in due time, usually before the start of the construction phase, with the Planning and Technology Development Department and the Central Maintenance Department.

All documents regarding electrical equipment (circuit diagrams, installation plans, wiring diagrams, terminal diagrams) must be submitted to the Planning and Technology Development Department and the Central Maintenance Department in duplicate before the assembly begins. It is necessary to take into account the necessary changes made at the place of assembly, which will not affect the cost of execution and delivery date.

The electrical equipment should only be made by the supplier upon receipt of documentation containing possible changes and having an endorsement note.

The approval of the documentation only applies to the principle of installation but does not release the supplier from his responsibility to provide a design that is in accordance with the intended use and the current state of the art, its proper functioning and the correct dimensioning of the components. Defects or deviations, which were not revealed during the inspection, do not release the supplier from the obligation to comply with SITECH's regulations concerning means of production. If, after the approval of the documentation, changes in the scope of electrical equipment occur, the documentation must be re-submitted for approval.

The tender must contain all the items listed in the tender documentation (Preismatrix).

If the tenderer foresees the possibility of using alternative solutions or additions, these shall be clearly identified. Appropriate justification and technical description should be attached. If it is anticipated that the elements of the installation will be transferred for execution in full to the subcontractor, then the scope of delivery and the subcontractor should be provided. SITECH reserves the right to reject subcontractors before accepting the order.

Maintenance and servicing of the production facility until it is handed over to the appropriate SITECH maintenance department will be carried out by the supplier’s company. The condition for the handover is to document the failure-free operation of the machine in a multi-shift mode in terms of the correct course of work processes with the expected human effort and required clocking times.

The ordering party should be provided with a functional device that complies with all applicable regulations. Comprehensive training / instruction for the user and the relevant maintenance department should be carried out after the handover.

1.4. Documentation

The documentation should be prepared in accordance with VOLKSWAGEN AG regulations regarding means of production and supplementary specific regulations and marked with one drawing number in accordance with the VW nomenclature (and also the name of the project in accordance with EPLAN), which will be provided on request by the Planning and Technology Development Department and the Central Maintenance Department.

The components of the offered range include the following documents:

- installation plans (layout plans), for the entire installation and for individual groups of control cabinets
- functional descriptions
- plans for the deployment of equipment
- circuit diagrams
- parameterization plans (bridge settings) for components
- schematic diagrams of internal connections for special components
- Profinet and Profibus network documentation
- terminal diagrams
- installation diagrams of control cabinets
- material lists
- interface and macro descriptions
- lists of wearing parts with a recommendation for spare parts
- operating and maintenance manuals
- rough description of the software structure
- network documentation
- software listings in the form of contact diagrams (ladders) with alphanumeric additional texts and a footer
- full list of links with topology
- program media (CDs, DVDs, flash drives) with complete application programs, symbolic addresses, and additional texts
- installation-specific firmware (transfer in the form of an additional backup copy)

2. Technical part

2.1. Technical data

Operating voltage	3 x 400V~, N,PE/50 Hz, +10%/-15%	
Cabinet's colour	RAL 7032 inside and on the outside (preferred)	
Cable core's colour	Three-phase power part min. 2.5mm^2	Black
	Current sinks below 10A-1.5mm^2	Black
	DC voltage 24V, min. 1 mm^2	Light blue
	Extraneous voltage 24V=1.5mm^2	Orange
	Control voltage 230V~/50Hz	Red
	General neutral conductor in circuit, min. 2.5mm^2	Blue
Ambient temperature	Hall level	Max 40 ^{o}C
	Transport level	Max 45 ^{o}C
	Overhead/rooftop zones	Max 55 ^{o}C

Industrial disturbances such as increased levels of pollution, sources of electromagnetic disturbances, oils, grinding dust with conductive properties, welding process dust, shocks, noise, etc. must be expected at all times.

All areas of control cabinets must be fully wired using the above-mentioned wiring system.

Each group of control cabinets will have a fold-out storage box for drawings on the inside of the SPS control cabinet door. All other elements of the control cabinets will be equipped with a metal pocket to store wiring diagrams.

Proximity switches must be used with plug connectors with 2 LEDs and a pinout according to DIN EN 50044.

The control cabinet should be built with as few fuses as possible. From the main switch outlet up to and including 16 A (also for three-phase current outlets), circuit breakers with an auxiliary switch must be used, which must be controlled from the SPS level.

Installation of the control cabinet should be made in a version with as few safety fuses as possible. From the main switch outlet up to and including 16 A (also for three-phase current outlets), self-contained fuses with an auxiliary switch should be used, which in terms of control technology must be controlled from the SPS level.

All contactor contacts must match upper and lower load values to prevent oxidation.

All control cabinets with terminal boxes etc. should be equipped with E1 lock.

All switchboards and switch cabinets must be protected against damage.

If devices are equipped with parallel drives, then motion synchronization will be required.

All reporting and signal cables must be equipped with LED plugs.

Ethernet network plug sockets must have IP-65 protection.

All necessary software licenses, which are required by law, must be provided.

2.2. Collecting information on energy consumption

The production machine should be equipped with devices enabling the measurement of media consumption:

- Electricity: AS 3-mini energy analyser + current transformers matched to the power of the production machine.

The energy analyser must be connected on the DIN rail of the electrical cabinet of the production machine according to the manual of that device.

2.3. Device operation modes, standby function, energy saving

2.3.1. Single motion (manual mode)

In this mode of operation, it must be possible to perform all movements at once, while the safety interlocks, depending on the operating factors, should remain active. After switching to "coupled operation" mode and after granting permission to start, it must be ensured that the machine will continue automatically from any position in which the device is located. Adjacent groups of desktops should automatically respond to motion commands (single man handling).

2.3.2. Setting mode

Switching to setting mode using an E7 key switch (for conveyors at service level E9) should only be possible with the "single motion" mode selected. The (machine) safety devices, which depend on the operating factors, are then deactivated. The motion limit switches remain active! The mode should only be used on hoists or other components of the system that are difficult to access.

2.3.3. Coupled mode (automatic mode)

In this operating mode, all locks and connections with all system components that are necessary for automatic operation are enabled. After each stoppage of the installation, regardless of the type of stoppage (emergency stoppage or operational stoppage), it must be possible to re-enter the installation in automatic mode by a simple start-up. Accidental activation of the sensor when the installation is inactive must not lead to an incorrect installation response (e.g. to blockage).

2.3.4. Simulation operation mode

This is a type of automatic operation with the difference that the machine does not perform production activities (e.g. CNC machine tools: full course of the machining cycle without the workpiece in the machining tool)

Generally, the following motion characteristics should be considered:

- Stopping in the starting position
- With detail without process
- Process without detail
- Full load process in automatic mode
- No load process in automatic mode

2.3.5. „Standby" mode

The machine and its peripherals must be able to switch to standby mode, which will reduce energy consumption as much as possible, but at the same time allow a quick resumption of work.

2.4. Smart machine lighting

Each machine, as well as the workplace lighting of that machine, should be equipped with energy-saving LED lighting.

The lighting of the machine as well as the whole machine should be able to switch to energy-saving mode. This means that the lighting must be divided into 2 circuits.

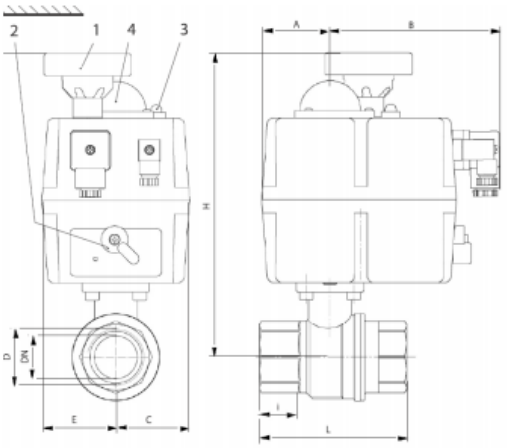
-circuit 1: necessary workplace lighting, switched on and off at the main desktop;

-circuit 2: smart interior lighting of the machine. This lighting will also be switched on/off at the machine's main desktop but will be switched off automatically when the door is closed in automatic machine operation mode and switched on after the "X" time. Only basic lighting is then available in the cab, which is sufficient for operation. When the safety door is open, all 3 phases are switched on.

An additional switch is installed at the safety door, which can be switched on at any time with the safety door closed.

2.5. Compressed air electrovalve

Each new production machine should be equipped with a ball valve 964 DN 15 brass PN 65 with 24 V electric drive (AKE964-1/2-L10-24V). During no production (when the machine is not producing) the electrovalve cuts off the air supply.



1. Handwheel
2. Control level (automatic / manual)
3. Indicating lamp
4. Optical switching position indicator

2.6. Actuator covers

Due to the welding process, the actuators built into the dies must be shielded with a spark-proof material (e.g. sheet metal)

2.7. Spark-proof hoses

In the working part of the die/device, the compressed airlines must be additionally covered with spark-proof protection.

2.8. Compressed air by-pass

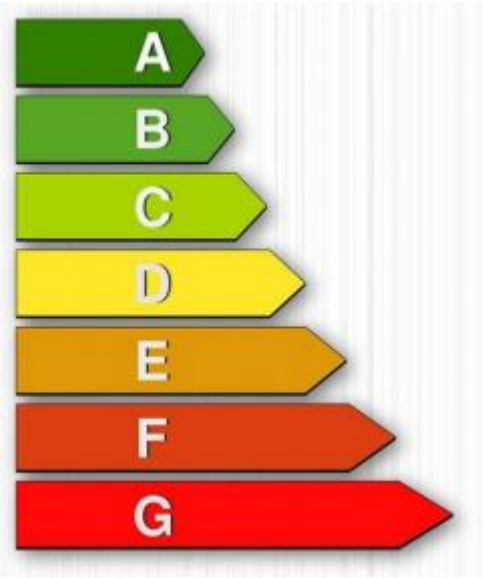
During the adaptation of new machines or relocation of old ones, a bypass should be made on the compressed air system at the machine. Such a bypass is to measure the compressed air or to check if the cabin generates losses in the form of leakage of this medium.

2.9. No compressed air pressure higher than 7 bar

It should be ensured that newly purchased machines use a compressed air pressure of not more than 7 bar. If this condition cannot be met, pressure boosters should be used together with a buffer tank. The choice of the amplifier should be done with the knowledge of the machine's compressed air intake.

2.10. Verification of energy consumption data by the machine manufacturer

During the acceptance of the machine as well as during production, the energy consumption must be verified with the data provided by the manufacturer. The energy will be measured by a maintenance electrician or by an analyzer that will be connected to the AS-Forte energy reading system.



2.11. Use of appropriate compressed air connectors

During the adaptation of new machines or relocation of old ones, it is necessary to make a compressed air installation of Sanha series materials (Sanha Therm).

2.12. Energy-saving motors

Each motor purchased with a given device must comply with the highest IE3 efficiency.

2.13. Ventilation hood

The ventilation hood located on each welding or sealing machine shall be equipped with an electronic throttle connected to the operation of the device.

In the absence of production on the machine, the BELIMO actuator closes the throttles from the hood after approx. 1 minute from the end of the welding and sealing process.

2.14. Energy-saving nozzles

Use energy-saving Silvent blowing nozzles with a suitable blowing force. (applies to laser cabins)