



Prepared by:	Guarantor:	Approved by:	Sheets	Annexes
Jaček, PSU/3 Donát, ŠE-TS	PSU/3	PS	188	

Technical conditions for supplies and assembly of pipelines, fittings, tanks, devices and pumps and putting them into operation. Deviations need to be justified and we require a written consent of ŠKODA AUTO, PSU/3 specialized department and ŠE-TS (Ško-Energo – TS department, hereinafter referred to as ŠE-TS)!

It is prohibited to use materials containing carcinogens It is forbidden to use varnish intolerant materials, or materials creating craters, e.g. materials containing silicone etc.

PPF-L/1 process department will carry out a material test if necessary. In this case the supplier must submit a certificate of product quality and grade.

Contents:

1.1	Offer, ITS obligatoriness and ITS exemptions.....	4
1.1.1	Offer	4
1.1.2	ITS obligatoriness.....	4
1.1.3	Exceptions to ITS provisions.....	4
1.2	Project documentation.....	4
1.3	Documentation of the actual design.....	4
1.4	Acceptance record.....	5
2	STANDARDS, REGULATIONS, DIRECTIVES	5
3	TECHNICAL REGULATIONS	7
3.1	Pipe design and assembly	7
3.1.1	Design.....	7
3.1.2	Tube arrangement.....	7
3.1.3	Tube connections	8
3.1.4	Fastening and anchoring tubes	8
3.1.5	Ventilation and draining.....	8
3.1.6	Pipe sets for meters and filters, standard VW PHS. No.: 1009	8
3.1.7	Labelling of pipes and fittings.....	10
3.1.8	Work on existing pipelines	10
3.1.9	Welding work	10
3.1.10	Pressure test and acceptance	10
3.2	Structural elements.....	12
3.2.1	Design of structural elements	12
3.2.2	Pressure vessels	12
3.2.3	Fittings - manometers.....	12
3.2.4	Thermal insulation	12
3.3	Compressor stations and compressors for the production of compressed air	12
3.3.1	Compressors	12
3.3.2	Compressor stations (KS).....	12
3.4	Cool water 6/12°C, pumping stations	13
3.5	Cooling water, pumping stations, cooling circuits.....	13
3.6	Extension of technological units.....	13
3.7	Service conditions of technological units	13
3.8	Cooling water quality in closed systems	14
3.8.1	Cooling water treatment in closed systems.....	14
3.8.2	Cooling water treatment in open systems	15
4	Components and suppliers used with priority in Škoda Auto:.....	16
5	Disassembly, waste disposal	17



5.1	Disassembly of existing equipment.....	17
5.2	Waste disposal	17
5.2.1	Liquidation of iron waste	17
5.2.2	Non-iron waste disposal- environmentally friendly disposal	17
6	SUPPLIED ENERGY, OPERATING MODES AND AREAS OF USE (EXCEPT EL. ENERGY)	18

The latest upgraded version of the ITS is available on „<http://cts.skoda-auto.com/>“, the company is not obliged to notify its business partners of the ITS upgrades.

Therefore, all business partners are strongly recommended to regularly check the ITS. These documents become valid on the day of their last upgrade. In case of signed contracts, it is crucial whether or not the ITS was valid at the time the order was issued.

Caution: In case of any differences between the English or German version of this ITS, the Czech version takes precedence. The Czech version is available on <http://cts.skoda-auto.com/>.

ITS 1.14 conforms to the organizational standard ON.1.056 Internal Technical Standard. ITS 1.14 deals with the technical design, materials and recommended manufacturers for the area of external and internal infrastructure, medical technology installations, compressed air, natural gas, industrial water, demi water and cooling water. Connection points in structures and for technology are managed in accordance with MP.1.906 Connection of Power Equipment. If the technology is connected to infrastructure, then the materials used and technical equipment of the related technological parts in the individual vehicle production operations must be in accordance with the organisational standard ON.1.016 Mechanical Equipment and the ITS, so that there is no threat to the quality and parameters of energy (water, compressed air, natural gas), i.e. production requirements documents must correspond to the ITS and their proposed technical solution should be submitted to specialist departments for a statement. Single-purpose technical equipment and technological units in vehicle production are governed by the technical brief and ON 1.016.

Note: Organisational Standards (ON) and Methodical Guidelines (MP) can be obtained upon request from technical departments of PSZ, PSU, ŠE TS

First edition: 1993-11-01

Change - number:	Date:	Remark:
1.	1997-01-22	Pages 1, 2
2.	2002-02-01	Font Arial, logotype ŠKODA AUTO
3.	2004-11-08	Pages 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
4.	2007-04-08	Additions to point 3.1 and 3.2
5.	2008-04-11	Additions to points 1, 2 and 3
6.	2011-11-24	Completely revised
7.	2012-03-15	Additions to point 3.1 and 3.2
8.	2013-11-13	Additions to point 3.2 - 1.
9.	2013-12-03	Additions to standards
10.	2014-02-12	Additions to point 3.1
11.	2015-01-13	Additions to point 3.2.8
12.	2015-07-09	Additions to point 1.4, 3.1, 3.2, 4 and standards on pages 5 and 6
13.	2016-03-23	Additions to point 1.4 on pages 4, standards on pages 5 and 6, point 3.1 on pages 7 and 8, point 3.2 on pages 13 and 14, point 4 on pages 16
14.	2017-09-19	PPU changed to PSU, VPB changed to PPB
15.	2017-10-17	ITS 1.14 revised – texts concerning ITS 6.22 „Heating devices and warming up water“ were removed
16.	2018-06-08	Page 4_ 1.4 Acceptance record
17.	2018-06-08	Page 5, 6_ 2 Standards, regulations, directives
18.	2018-06-08	Page 8_ additions to table 2.1
19.	2018-06-08	Page 12_ thermal insulation
20.	2018-06-08	Page 12_ Compressor stations
21.	2018-06-08	Additions to point 3.3, 3.5, 3.6 a 3.7
22.	2018-06-08	Page 13 Addition to thermal insulation
23.	2018-06-08	Additions to point 3.8
24.	2019-01-16	Additions to page 2
25.	2019-01-16	Additions to point 2 Standards, Regulations, Directives
26.	2019-01-16	Additions to table 4. Supplied Energies
27.	2020-03-10	Completely revised according to the model 3276 Internal Technical Standard

SUPPLIER-CUSTOMER RELATIONS

1.1 Offer, ITS obligatoriness and ITS exemptions

1.1.1 Offer

For the preparation of the offer, it is necessary for the supplier to verify at the construction site the current status of essential construction dimensions, assembly openings, transport routes, etc. The exact work schedule will need to be agreed upon with the PPB division after the submission of the order. Changes by the supplier between the offer and the final status do not justify increasing unit prices. The supplier shall accompany the offer with a set of technical connection values and requirements for quality of heating media. The submitted documentation must contain drawings of equipment implementation with the dimensions of connection pipes and a chart with a description of the functions and other necessary technical data, including an implementation schedule.

1.1.2 ITS obligatoriness

Internally-technical standards are binding for all employees of the Company as far as their professional activities are concerned. Outside, the Company's departments perceive the ITS provisions as binding in technical, business, operational or other contacts and negotiations. Following of ITS provisions is included in the technical specifications, projects, purchasing conditions, technical and acceptance conditions as well as in other documents, in particular of a contractual nature.

Components from other manufacturers or of non-standard types may only be used with a permission from division PSU/3 and ŠE-TS (Ško-Energo - division ES, hereinafter "ŠE-TS")!

1.1.3 Exceptions to ITS provisions

If, for objective reasons, it is necessary to apply a deviation from the applicable ITS provisions for a transitional period or for a single specific event, the PSZ department may grant a transitional exception upon prior consultation with the ITS PSU/3 administrator and ŠE-TS. The exception to the ITS provisions shall not be in conflict with an external generally binding regulation (law, regulation, technical standard, etc.) and is documented in writing.

Technically comparable components from other manufacturers or non-standard types may only be used with the approval of PSU/3 and ŠE-TS! (Ško-Energo - TS department, hereinafter referred to as ŠE-TS).

1.2 Project documentation

Before the drafting of project documentation, project contractors are obligated to consult the ŠE TS department about connection points, pipeline routes, the material design of components, the requested parameters and the energy balance.

The project supplier shall submit the technical documentation in the required extent by the deadline stipulated in the contract. All project particulars are based on valid regulations - Act No. 183/2006 Coll., the Building Act, Decree No. 499/2006 Coll., on documentation of construction sites, the Performance and Fee Rules. The supplier shall submit the agreed number of printed copies in paper form and one version in digital form - Microstation and/or LIDS, AutoCAD, Adobe Acrobat.

1.3 Documentation of the actual design

The scope and contents of the documentation of the actual design is determined by Decree No. 499/2006 Coll.

No later than at the time of receipt, the supplier of the pipe equipment shall present technical documentation reflecting the actual condition, in three copies. The documentation must include the following in particular:

- accompanying drawings, with an exact drawing of the distribution pipelines and installation of all equipment
- charts with descriptions of the equipment's operation and bases for calculations
- drawings of technological parts with respective cross sections

The drawings of equipment and pipe routes must be prepared in accordance with valid ČSN standards, including labels and descriptions of individual branches.

1.4 Acceptance record

The handover must be performed according to ITS 1.01.

The handover method for the items given below in the chart: 2 data carriers are required with all items recorded on them, 1 for the owner, 1 for ŠE. Also, 3 printouts are required– 1 for the owner, 2 for ŠE.

In addition, there is a list of requirements regarding the handover which contains a list of documentation and technical data specified for acceptance for operation:

Serial No.	Documentation title	Handover method
1	List of the submitted documentation according to this sheet and the serial number.	
2	Project documentation of the actual implementation - printout (paper, lamination, etc.) + electronic Unless stated otherwise in the contract or the technical specification, the SW formats must correspond with ITS 1.01, Point 3.2.7 (see below) Recommended formats: - - for el. documentation DGN, DWG, EPlan ver. 5.xx and higher (only in the event of a specific requirement, PDF - - for sketches: DGN, DWG, DXF - - for the text section, piece sheets, tables: DOC, XLS	
3	Catalogue and material certificates (passports) of installed equipment, sensors, drivers, valves, pressure controllers, pumps, DDC substations, thermometers, etc., with specifications of technical parameters and a description of the equipment functions	
4	Manual for operation of the delivered equipment, preliminary draft of operating rules, preliminary draft of the local emergency plan - see ON Buildings, constructions, land	
5	Manual for maintenance of equipment, including servicing intervals, lubrication plans, etc.	
6	Record of training regarding operation and maintenance (attendance sheet, trainer, training curriculum - a separate chapter in the operation manual drawing attention to safety risks). The investor shall ensure the availability of persons for training at the supplier's request.	
7	A record of the pressure test, stability and tightness of pipes	
8	An initial revision report for pressure tanks - the passport, certificate for safety valves, test record (functional test) of safety valves and other safety devices and elements	
9	Records of implementation, configuration, putting into operation, functional tests and individual testing, contacts	
10	Attests, certificates for the supplied equipment, certificates of approval	
11	A table of valve settings, temperature parameters, time programs, etc.	
12	Keys to the equipment, remote controllers, portable control elements	
13	Geodetic measuring of the position and depth of underground networks	
14	A declaration of conformity for the whole work including partial declarations for sub-deliveries	
15	Declaration of the company's proficiency, welding certificates	
16	Lists of spare parts and quickly worn parts	
17	Other certificates according to the contract for work and project documentation	
18	Initial revision report on electrical equipment, MaR devices	
19	Piece-test record, including quality certificates and completeness of the MaR switchboards, electrical installations	
20	Silicon-free records for crater-making materials, e.g. silicone-containing material, etc.	

2 STANDARDS, REGULATIONS, DIRECTIVES

All of the pipe equipment must comply with the requirements of valid standards and regulations regarding occupational safety and requirements for economical and environmentally friendly operation.

The following list is a selection of standards, regulations and directives valid in the Czech Republic:

-compressors:	
ČSN 105004	Compressors. Stationary and portable air compressors. Safety regulations for construction, assembly, operation and maintenance
ČSN 109005	Pneumatic mechanisms. General safety requirements.
ČSN EN ISO 6708	Pipe components – Definition and selection of nominal brightness levels - DN
ČSN 130020	Industrial piping (metal) - Part 7: Instructions for application of procedures of evaluation of conformity.
ČSN 130108	Piping. Operation and maintenance of piping. Technical regulations.
- cooling:	
ČSN EN 378 + A1/A2	Cooling equipment and heat pumps – Safety and environmental requirements – Part 1: Basic requirements, definitions, classification and selection criteria
- gas pipes and equipment:	
ČSN EN 12007	Supplying with gas - gas installations with maximum operating pressure of up to 16 bars, inclusive - Parts 1-4
ČSN EN 1775	Supplying with gas - gas pipelines in buildings – max. operating pressure < 5 bar
ČSN 38 6420	Industrial gas pipelines
TPG 702 01	Gas pipelines and connections, Gas pipelines and fittings made of polyethylene
TPG 704 01	Offtake gas equipment and appliances for gaseous fuels in buildings
TPG 609 01	Gas pressure regulators for inlet pressure up to 5 bar including - Placement and operation
Law No.458/2000 Sb.	Energy Act, as amended
Decree of the Czech Patent Office No. 85/1978 Coll.	Inspections, revisions and tests of gas equipment



MP.1.738

Operation and revision of gas equipment

-water installations: rainwater, sewage system:

ČSN 75 5409	Water installations inside buildings
ČSN 75 5411	Water mains connections
ČSN 01 3462	Engineering structures drawings Water supply drawings
ČSN EN 805 (75 5011)	Water supply - Requirements for systems and components outside buildings.
CSN 75 5401	Designing of water pipeline
TNV 75 5402	Building of water piping
TNV 75 5408	Block of water pipes
TNV 75 0211	Designing of underground water pipeline - statistical calculations

calculations

TNV 75 5950	Operating rules of water piping
ČSN 75 5630	Water piping underground crossing below railways and roadways
ČSN 75 5911	Pressure tests of water and irrigation pipelines
ČSN 75 5115	Ground water abstraction
ČSN 75 5355	Waterreservoirs
ČSN 75 9010	Design, construction and operation of storm water
TNV 75 9011	Rainfall water utilization
ČSN 75 6261	Stormwater detention basins
ČSN 75 2410	Small water reservoirs
ČSN 75 6110	Waste water pumping stations on a sewer system
ČSN EN 1610	Construction and testing of drains and sewers
ČSN 75 6510	Separator systems for light liquids
ČSN 75 6551	Separator systems for light liquids (e.g. oil and petrol)
ČSN 75 6909	Testing water-tightness of drains and sewers
ČSN EN 1917	Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced
ČSN 73 6133	Earth works
ČSN 73 6006	Warning devices for identification of underground conduction
ČSN 73 6005	Space arrangement of conduit of technical equipment

And other relevant standards of class 75 WATER MANAGEMENT AND 73 DESIGN AND CONSTRUCTION OF BUILDINGS.

- pipe materials:

ČSN 425710	Regular threaded steel tubes. Dimensions
ČSN 425711	Reinforced threaded steel tubes. Dimensions
ČSN 425715	Seamless pipes shaped at a hot temperature. Dimensions
ČSN EN ISO 1452	Plastic pipe systems for carrying water and pressurised sewer connections and mains located in the ground and above ground - Unsoftened polyvinylchloride (PVC-U) - Parts 1-5
ČSN EN 12201	Plastic piping systems for carrying of water - Polyethylene (PE) - Parts 1-5

- piping joints

ČSN EN 1092 +A1	Flanges and their joints - Circular flanges for tubes, valves, fittings and accessories, PN designated - Parts 1-4
-----------------	--

- piping installation:

ČSN 736005	Spatial arrangement of technical equipment networks
ČSN 755409	Water installations inside buildings
ČSN EN 806 – 1	Water installations inside buildings to distribute water for human consumption

- pipe labelling:

ČSN 130072	Piping. Pipe labelling according to operating fluid.
------------	--

-pressure tests, flow rates, calculations

Act No. 274/2001 Coll. on water mains and sewers for public use, amended in 2011 by Decree No. 120/2011 Coll.	
ČSN EN 806-1-5	Specifications for installations inside buildings conveying water for human consumption - Pressure test, flushing and disinfection of piping system (according to this standard)
ČSN 75 6760	Drainage systems inside buildings - Sewer tightness test (according to this standard)
ČSN EN 12056-2	Gravity drainage systems inside buildings - Part 2: Sanitary pipework, layout and calculation
ČSN 75 6701	Sewerage networks and connections
ČSN EN 1717	Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow
ČSN 75 5455	Calculation of water installations inside buildings

- welding

ČSN ISO 3834 - 1 to 6	Quality requirements for fusion welding of metallic materials
ČSN EN ISO 5817 (050110)	Welding – Weld joints of steel, nickel, titanium and their alloys made by fusion welding (except for electron beam and laser welding) – Determination of quality grades
ČSN ISO 15614 - 1	Determination and qualification of welding processes for metallic materials – Welding process testing – Part 1: Arc and flame welding of steel and arc welding of nickel and nickel alloys

- pumps:

ČSN 110010	Pumps - General provisions
------------	----------------------------

For all machines and equipment applies the standard ON.1.016 Machinery

3 TECHNICAL REGULATIONS

3.1 Pipe design and assembly

3.1.1 Design

Pipe materials and dimensions. Unless otherwise expressly required, it is necessary to use the following specified materials:

- regular threaded seamless tubes in accordance with ČSN 425710, material 11353.0, 11353.1 with guaranteed weldability
- reinforced threaded seamless tubes in accordance with ČSN 425711, material 11353.0, 11353.1 with guaranteed weldability
- smooth seamless steel tubes in accordance with ČSN 425715, material 11353.0, 11353.1 with guaranteed weldability

Usage: industrial steam, oil-treated water, natural gas

- threaded tubes treated with zinc in accordance with ČSN 425710: to DN 50, pressed joints (from DN 10)

Usage : drinking water, industrial water, cooling water for closed and open cooling circuits (e.g. welding facilities, paint shops, mechanical and metallurgic plants), pressurised air – after a prior agreement with the SE-TS department (pipes connected to grooves may be used starting from DN 65)

- tubes treated with zinc in accordance with ČSN 425710 connected to Alvenius grooves, DN 65 and higher, pressed joints (to DN 100)

Usage: drinking water, industrial water, cooling water for closed and open cooling circuits (e.g. for welding facilities, mechanical and metallurgic plants), pressurised air

- plastic piping systems for industrial applications pursuant to ČSN EN ISO 15494
- PVC plastic tubes pursuant to ČSN EN 1453, ČSN EN ISO 1452 -
- PVC-U polyvinylchloride unsoftened, pressure series PN 16
- IPE and rPE plastic tubes pursuant to ČSN EN 12201 and ČSN EN 13244
- tubes and moulds from polyethylene:
- PE 100 SDR 11, pressure series PN 16
- plastic tubes from PP pursuant to ČSN ISO 15874 and ČSN EN 1451
- tubes and moulds from kopopolymer polypropylene: polypropylene, pressure series PN 16, PN 25

Usage of plastic pipes: waste pipes, water installations, aggressive substances, cooling water, de-mineralised water, compressed air (max. 8 bars), oil-treated water, natural gas

- pipes from moulded alloy with cement or polyurethane lining

Usage: drinking water, industrial water, cooling water (for closed and open cooling systems, underground lines)

- concrete pipes, pipes made of fibreglass, glazed aggregate, sewage PVC, PE lining, repairs not involving digging - Relining

Usage: drains for rainwater, sewage (single, chemical)

- piping made of copper and its alloys

Usage: heating gases, technical gases

- stainless steel pipes AISI 316 L welded or flanged joints, grooves, pressed joints (from DN 10 to DN 100)

Usage: technical gases, special distribution lines for operating media, cooling water for closed and open cooling circuits (such as welding facilities, paint shops, mechanical and metallurgic plants), compressed air

- plastic-treated steel pipes connected to grooves or flanges

Usage: drinking water, industrial water, cooling water for closed and open cooling circuits

(e.g. welding facilities, paint shops, mechanical and metallurgic plants), oil-treated, aggressive substances, de-mineralised water, compressed air

- aluminium pipes connected by couplings, pressed joints

Usage: compressed air, (cooling and industrial water also possible)

Notice about the material design of piping:

For cooling, drinking, industrial and de-mineralised water, in view of the chemical composition of these types of water, it is necessary to prevent the occurrence of corrosive products and subsequent mechanical impurities in the piping. Škoda Auto requires that the following priority of materials be adhered to based on technological and construction capabilities: **plastic-treated piping, rust-free pipes, zinc-treated, shaped alloy, plastic.**

The following priority of materials should be complied with for the material for pipes for carrying compressed air due to medium purity: **aluminium pipes, plastic-treated pipes, stainless pipes, plastic pipes, zinc-coated pipes.**

It is also necessary when selecting piping materials to take into consideration external effects of the environment on the proposed pipe material, such as electrochemical effects when different materials and media are combined, UV radiation, temperature, combustibility, resistance to infrared radiation, strong magnetic fields (**e.g. at welding facilities**) and extreme mechanical burden in the event of storage beneath roadways.

3.1.2 Tube arrangement

The professional division ŠE-TS shall specify the connection point. The project planner is required to verify the capacity in the connection point, so that existing technology is not jeopardised. The connection of branch pipes to the backbone distribution systems for water and compressed air is to be carried out using bracing (with the connection joints on the upper side) and installing a removable shut-off valve on each branch pipe at the points of connection with the backbone distribution systems. The connection of individual machines and equipment must be carried out only with the lowest investment as well as operating costs taken into consideration (an economical number of splitters,



ittings, etc. should be proposed). For newly built premises, it is necessary (if technically possible) to propose a joint energy headquarters for the entry of all energy media.

The tubes must be fed parallel with the main axes of the premises, maximally in two horizontal levels, in relation to which we shall consider the bottom edge of the piping to be the height of the piping.

The weathering of the piping must be carried out at a maximum of 2%.

The distance of tubes from building structures and between pipes is set according to ČSN 736660 and any amendments thereto. The minimum distance between insulated pipes must be 80 mm, and for fittings between hand wheels 60 mm.

The piping system must be designed so that in the event of an outage of any subscriber location or in the event of maintenance or installation work, the supplying of other appliances will not be put at risk (collecting, circular or grated piping network fitted with sectional seals). This does not apply to small pipelines. All changes in direction in the piping need to be made via elbows and bends. Sharp corners are not permitted.

For aligning the thermal dilatation of piping, the piping must be fitted with compensation sections or compensators (do not use compensators with a rubber bellow on backbone lines, use natural compensation sections U, L, Z or corrugated tubes). The proposal of these compensators must be accompanied by a calculation in the submitted documentation.

For plastic pipes, plastic-treated pipes and aluminium pipes, only the fittings required by the manufacturer should be used.

3.1.3 Tube connections

For drinking water, cooling water, industrial water, de-mineralised water, pressurised air and gases, the following types of tube connections apply:

Zinc-treated steel pipes - flanges, threaded connections, grooved connection, pressed connection

Plastic-treated steel pipes - flange connections, groove connection

Stainless steel pipes - welded connections, flanges, grooved connection, pressed connection

Aluminium pipes – connected using manufacturer's connectors (to be used only for compressed air)

Plastic pipes - welded connections (polyfusion, bottom), glued connections, flanges, electric fittings, connecting sleeves, pressed

When welding, it is necessary to comply with the basic provisions valid for welding and with the manual from the pipe supplier.

Work must be carried out by employees who hold welding badges for welding plastics. Welding badges are also obligatory for lower welding personnel. The method of obtaining qualifications is stipulated, for example, in ČSN EN 13067, TPG 927 04, TPG 927 05 and TNV 75 5517.

Plastic pipes - for assembly, pipe connections, affixing and compensation, the pipe manufacturer's assembly and technological manual must be followed.

In locations where open flames cannot be used during future disassembly of piping, the piping must be fitted with threaded, grooved or flange connections. Reclosable connections need to be placed in a well accessible location. The maximum pitch between reclosable connections is 12 m in a longitudinal direction.

Reclosable fittings (valves, slide valves, ball valves) must be mounted on the pipe by means of reclosable connections.

Tightening of the screws of flange connections must be done in a regulation compliant manner using a torque wrench. Before assembly, the thread needs to be coated with lubricant containing graphite.

The materials and types of flange connections is based on the type of transported media and its condition.

Plastic pipes and groove connections must be connected in accordance with the pipe manufacturer's technological guidelines. The assembly company during technical negotiations shall present a valid certificate from the pipe manufacturer, which authorises the company to carry out the particular work tasks.

3.1.4 Fastening and anchoring tubes

Fastening and anchoring of tubes must be carried out with the help of type reinforcing element (clamps, holders, hinges). The designer is obliged to prepare a proposal for the anchoring of tube routes (proposal for distances between anchoring points, types of anchoring – fixed point, slideways and axial lines) and support the proposal by statistical calculations. The pipe shall not serve as a hanging system for hanging another pipe. Each pipe must have its support system.

Hinges of tubes, solid points and pipelines must not be welded together with pipes, so that disassembly and reassembly of piping can be carried out easily.

In order to reinforce plastic tubes, it is necessary to carry out support in the manner required by the plastic tube manufacturer.

In order to reinforce aluminium tubes, it is necessary to carry out support in the manner required by the aluminium tube manufacturer.

Passage of pipes through ceilings or walls made from construction materials must be carried out in a protector made of inflammable material (fire seals).

Underground laying of piping should be done:

- in accordance with ČSN 736005 Spatial arrangement of networks of technological equipment and in accordance with any amendments thereto
- based on individual piping materials and the ČSN standards assigned to them and any potential amendments thereto

Drinking water - Ensure priority to the implementation of new backbone of drinking water in the ground, if the lead is in the collector must be higher insulation class.

3.1.5 Ventilation and draining

It is necessary to place appropriate main seals, ventilation and draining devices on all piping equipment. The draining fittings on backbone distribution lines DN100 and higher need to be installed in dimensions of at least DN 50. For drinking water, drainage to the sewer with timer switch must be installed on the end pipe branches (in places where there is minimal drinking water off-take and flow).

3.1.6 Pipe sets for meters and filters, standard VW PHS. No.: 1009

At each pipe entrance to the premises, it is necessary to create a set with a filter and meters of flow, temperature and pressure. The meters must be supplied including a calibration certificate, must be readable on site and also must have a transfer to the Škoda Auto a.s. measuring system. Meters and filters (pressurised air, water (drinking, industrial, cooling, oil-treated, de-mineralised) should be fitted with bypasses, which ensure an uninterrupted supply to the premises in the event of a malfunction of meters or filter clogging during replacement of the filter pad.



VW PHS standard. No.: 1009 - **Records of energy data of premises of organisational units, equipment and machines**

Straightforward allocation and transparency of energy consumption in premises of organisational units or at facilities and machines with the help of installation of stable measuring equipment and/or equipment for access measuring points. This will enable collection and documentation of data regarding consumption as well as identification and evaluation of potential energy conservation.

Requirements:

Installation of stable measuring equipment and/or access measuring points depending on the type of energy and output according to tables 2.1 and 2.2

Implementation at:

new equipment and exchanges and/or restructuring measures

Stable measuring points (table 2.1) are intended to ensure safe placement of permanent measuring without restrictions on running operations.

Access measuring points (table 2.2) are intended to enable safe placement of temporary measuring devices without restrictions on running operations and without necessary reconstruction during measuring of media.

table 2.1

Type of energy	Stable measurement	
	Installed / nominal input (and higher)	Usual dimension of connection (and higher)
Cooled water	400 kW	DN 80
Cooling water	100 m³/h	DN 125
Natural gas	All appliances	----
Compressed air 6 bar	500 Nm³/h	DN 50
Compressed air 12 bar	300 Nm³/h	DN 32

Table 2.2

Type of energy	Measuring access point	
	Installed/ nominal input	Usual dimension of connection
Cooled water	100 kW	DN 50
Cooling water	14 m³/h	DN 50
Compressed air 6 bar	100 Nm³/h	DN 20
Compressed air 12 bar	100 Nm³/h	DN 15



3.1.7 Labelling of pipes and fittings

All pipes laid in the area need to be labelled in colour and marked in accordance with ČSN 130072 and any amendments thereto. On connections for pipes for machines and equipment, it is necessary to carry out permanent and clear labelling, including indication of the flow direction. The tags must be placed in a visible location.

E.g. The water medium shall be indicated in green, and a stripe shall be painted on the pipe, or masking tape shall be used. The piping will be labelled with stripes at distances of approximately 15-20 m from each other.

All pipelines in the facilities must be labelled in the same way as in the machine rooms, behind each transit through a wall (in a visible location) or in the event of pipes running above the ceiling, a label should be placed on the frame of the ceiling, and the labelling must correspond to the labelling in the work sketches for ensuring quick orientation. All important sealing and dividing fittings shall be labelled separately with a description.

3.1.8 Work on existing pipelines

Connection of new consumption to existing pipe systems is resolved by methodical instruction MP.1.906 "Connection of New Appliances to Existing Energy Distribution Lines".

Intervention in functioning powering networks may be carried out only by specialists. All interventions in the piping systems are subject to prior approval by division ŠE-TS. The supplier is not under any circumstances authorised to remove powering equipment and pipelines, to drain them, to fill them or to return them to operation without the permission from the operator, division ŠE-TS.

In the event of repairs to equipment connected to powering networks, the supplier must ensure before starting the activity that essential warning tags and warning tables are placed by dangerous media.

During work on parts of the pipelines (networks), it is necessary to firmly attach feeding pipes and fittings with stoppers and caps.

Before intervening in underground powering networks, it is necessary to carry out measuring and demarcation of other crossing or closely running energy networks and to request a sketch of underground networks in the basic map of the facility - professional division PPB.

All work tasks related to pipe networks must be carried out by the supplier in cooperation with the operator of the energy distribution lines, division ŠE-TS.

3.1.9 Welding work

Welding work on pipelines may be carried out only by employees with authorisation and permission from HZS ŠKODA AUTO a.s.

Welding and attaching work on plastic pipes may be carried out only by workers who are authorized to do this work, see point 3.1.

3.1.10 Pressure test and acceptance

After completion of assembly, it is necessary to flush the pipes and parts of equipment or air them out by blowing and to perform the required test of tightness and a pressure test and hand over the necessary documents. The acceptance of the pipes and equipment shall be carried out by the technical supervisors designated by the PPB division. The pressure test is performed by using pressure which is 1.5 times the operational pressure. Pressurizing has to be done at least 12 hours before the test itself. The procedure according to EN 806-4 and ENV 12108 (for plastic pipes): the system is filled with water, deaerated and, by means of additional pumping, pressurized, creating the test overpressure of 15 bars. This value is maintained by additional pumping for 30 minutes. Then the overpressure is reduced (the values slightly differ, it is caused by an additional definition of MDP in ČSN_73 66 60 – Z3) and after that there must be no loss of pressure for 60 or 90 minutes (figure 1 and 2).



Figure 1

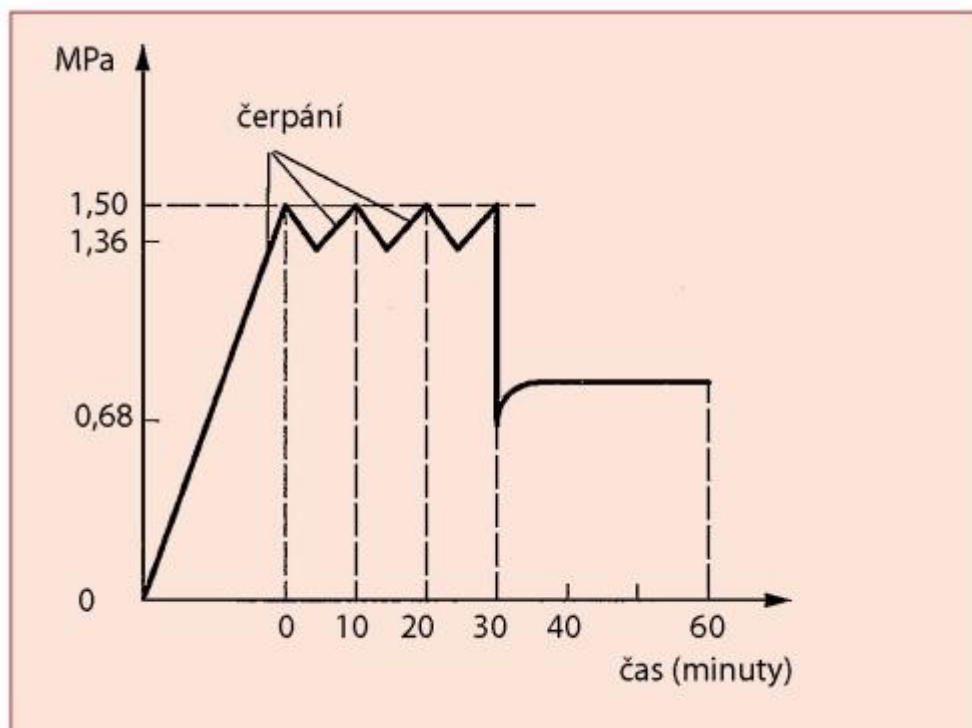
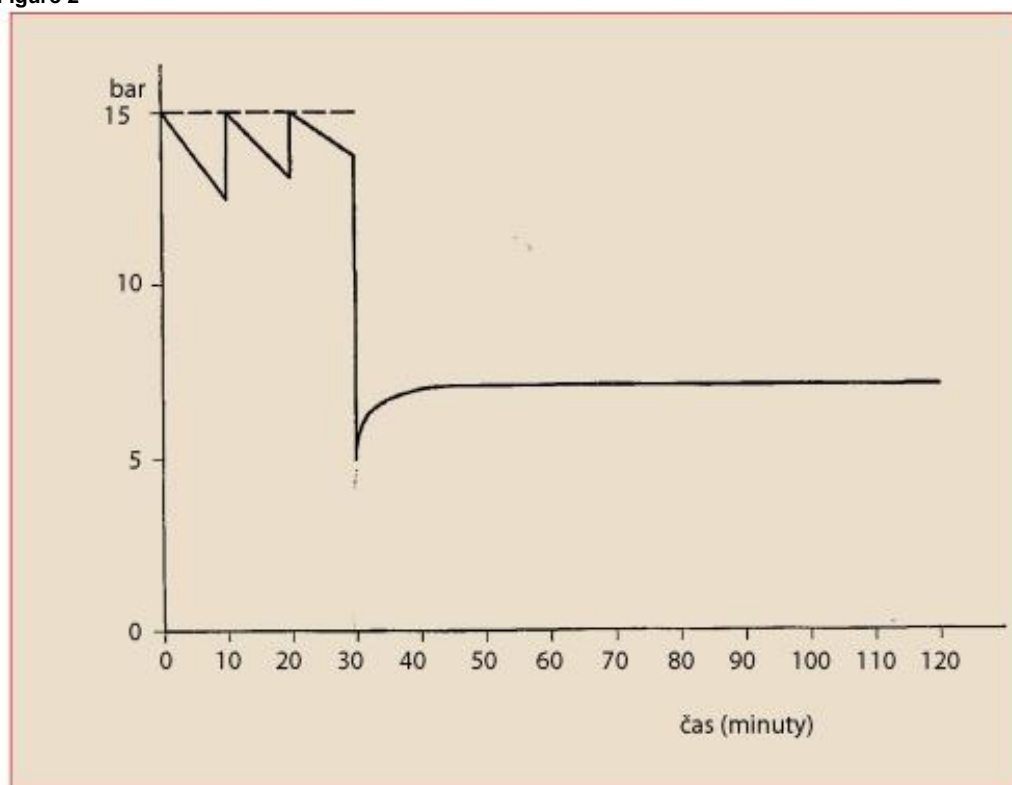


Figure 2



3.2 Structural elements

The material or area of use of structural elements shall be defined by Škoda Auto in cooperation with ŠKO-ENERGO, s.r.o.

3.2.1 Design of structural elements

All pipes and tanks must be fitted on connecting parts with sealing fittings.

In the lowest part of the pipe and tank, a drain fitting must be mounted, which will need to be placed so that it is well accessible. Ventilation needs to be set up at the highest point in the pipe as well as closed tank. The pipes as well as tanks must be fitted with equipment for safe filling and draining. The welding handles of connecting pipes must be welded from both inside and outside with the wall.

3.2.2 Pressure vessels

The technical conditions for deliveries of pressure vessels needs to be agreed upon with Škoda Auto, see ITS 6.21 - Stationary pressure vessels.

3.2.3 Fittings - manometers

Before each manometer, it is necessary to mount a sealing fitting with control piping - a manometer faucet.

Safety fittings - securing valve, emergency sealing valves - must be checked in accordance with regulations.

The fittings must fulfil the quality parameters in the full extent of the temperature and pressures of the work media.

Dividing fittings on external backbone distribution lines and fittings at entrances to premises must be designed for pressure PN 16.

Fittings and devices inside premises must be designed for pressure PN 10; this applies for:

- drinking, industrial, oil-treated and cooling water, de-mineralised water, pressurised air 6 bars

Dividing fittings on outdoor backbone distribution lines and fittings at entrances to premises must be designed for pressure PN 25. Fittings and devices inside premises must be designed for pressure levels PN 16 and Pn 25; this applies

- to compressed air (12 bars).

The fittings must be installed in a location that will enable performance not only of routine manipulation, but also of easy assembly and disassembly.

3.2.4 Thermal insulation

For water installations and equipment inside buildings, the thermal insulation of the pipe must protect against dewing. In case of external water distribution lines, it must protect against freezing.

In the case of compressed air piping, it must prevent internal condensation in the piping and prevent freezing of condensate collectors.

Outdoor condensate collectors shall be provided with anti-frost heating.

Vacuum drainage system - drains

Before selecting a specific flat roof drainage system, make a project proposal - whether the selected system includes roof drains for its particular roof structure. Some drains are required for thermally insulated roofs, others for walk-on and drive-on roofs, or for green roofs. In the case of insulated roofs, the drains must be properly insulated against frost, in other cases, secured against frost, e.g. with electric heating.

Surface adjustments of insulation:

External distribution lines

- surface adjustment of aluminium embossed sheet metal with a thickness of 0.8 mm or zinc-treated sheet metal with a thickness of 0.8 mm with a heating cable
- pipes from DN 80 mm
- aluminium embossed sheet metal with a thickness of 0.55 mm or zinc-treated sheet metal with a thickness of 0.55 mm.
- piping up to DN 65 with a heating cable
- Internal distribution lines
- insulation made from foam polystyrene, synthetic rubber

3.3 Compressor stations and compressors for the production of compressed air**3.3.1 Compressors**

The production of compressed air for facilities within the plant shall be kept central.

- shall be pre-equipped for heat recuperation reaching up to 90% of the output.
- Design the compressors at the station as $n + 1$.
- Pre-heated air for compressor suction shall be solely prepared in line with the compressor producer's guidelines.
- Preferably use water-cooled compressors
- Various compressor sizes must be designed for basic, operational and peak loading.
- Based on economic analysis, small units (up to 5,000 Nm³/hour) shall be designed as magnetically stored turbos.
- Frequency converters shall be used with compressors.

3.3.2 Compressor stations (KS)

- Compressor sets shall be equipped with a superior device.
- In case of operation request (according to Lastenheft), the compressed air cooler shall be used in the compressor station.
- The compressed air output from the compressor station is filtered, measured by flow, pressure, temperature, dew point with readable meters and remote transmission to MaR
- The cooling water for the compressors shall be provided with filtering and flow measuring

Each technological consumption place in production halls shall be fitted with a micron filtration system (plus bypass or a pair of filters depending on the type of operation where continuous supply of media is required) according to the Lastenheft for the given technology.



At each facility entrance point, the system of flow, temperature and pressure measurement and for the MaR transfer, and also readable manometers with the bypass of the whole measuring system, shall be fitted with a micron filtration system (plus bypass or a pair of filters depending on the type of operation where continuous supply of media is required) according to the Lastenheft requirements, pressure gauges and corresponding measuring equipment according to Tab. 2.1 and Tab. 2.2. - PHS standard. Nr.: 1009 (ITS page 9).

For each technological consumption point, manometers and the relevant measuring devices according to chart 2.1 and 2.2 shall be fitted with a micron filtration system in line with the Lastenheft. - standard PHS. No.: 1009

3.4 Cool water 6/12°C, pumping stations

For cold water systems 6/12 °C, use closed cooling circuits. Design the components of the cooling stations as n + 1.

- Temperatures a pressures of cooling circuits shall be designed according to the technology and guidelines of the relevant Lastenheft.
- Central cool water stations shall be designed for individual facilities.
- Pumps design and chillers with FM.
- Individual reverse pipe branches of cool water shall be fitted with balancing valves.
- Electric engines of pumps shall achieve efficiency meeting the requirements of IE4, IE5 energy class.
- Regulatory elements shall be designed for projects of cooling systems, enabling to reduce the flow of cool water in the system at non-operational times.
- The cool water outflow from the cooling station shall be fitted with meter of flow, pressure, temperature, readable meters and remote transmission to MaR with the bypass of the entire measuring system.
- On the reverse pipe of heated cool water, set pressure and temperature measurement
- At the cool station, make a bypass between displacement and reverse pipe
- Regulatory fittings for tower cooling water flow shall be designed for projects of cooling systems, enabling to reduce the flow of cooling water in the system depending on the performance of the chiller and to reduce/stop the flow at non-operational times.
- Design of the storage vessels according to the technology requirement
- Cool water pipes 6/12 °C along the entire length - provide insulation
- For the system for cooling water and supplementation use modified industrial water in accordance with the technology requirement

3.5 Cooling water, pumping stations, cooling circuits

Closed cooling circuits shall be used for cooling water systems.

- Design the components of the cooling stations as n + 1.
- Temperatures a pressures of cooling circuits shall be designed according to the technology and guidelines of the relevant Lastenheft.
- Central cooling water stations shall be designed for individual facilities.
- Pumps with revolutions control at the pumping station shall be controlled by means of appliances (pressure measurement at the most distant appliance).
- Individual reverse pipe branches of cooling water shall be fitted with balancing valves.
- Electric engines of pumps shall achieve efficiency meeting the requirements of IE4, IE5 energy class.
- Pumping technology at pumping stations for coolig water shall be equipped with a superior control system.
- Regulatory elements shall be designed for projects of cooling systems, enabling to reduce the flow of cooling water in the system at non-operational times.
- For cooling systems, filtration and chemical industrial wastewater treatment plants shall be used for the technological needs defined by the relevant Lastenheft of individual production facilities.
- The cooling water outflow from the cooling station shall be fitted with meter of flow, pressure, temperature, readable meters and remote transmission to MaR with the bypass of the entire measuring system.
- On the reverse pipe of heated cooling water, set pressure and temperature measurement
- Place pipe filters before the reverse pipe
- At the cooling station, make a bypass between displacement and reverse pipe

At each facility entrance point, the system of flow, temperature and pressure measurement and for the MaR transfer, and also readable manometers and thermometers with the bypass of the whole measuring system, shall be fitted with micron filtration (with bypass or a pair of filters depending on the type of operation where continuous supply of media is required) according to the Lastenheft requirements. Make bypass between displacement and reverse pipe.

For each technological consumption point in the production hall, manometers and the relevant measuring devices according to chart 2.1 and 2.2 shall be fitted with micron filtration (with bypass or a pair of filters depending on the type of operation where continuous supply of media is required) in line with the Lastenheft. - pressure gauges and corresponding measuring equipment according to Tab. 2.1 and Tab. 2.2. - PHS standard. Nr.: 1009 (ITS page 9).

3.6 Extension of technological units

In case the existing technological units are being extended (i.e. compressor stations, cooling stations, cooling stations, water treatment plants, air treatment plants, filter stations, control stations and other sets of two or more devices (i.e. from where there is one outlet of a particular medium to the plant or to the technology of production from this technological unit), e.g. due to capacity increase, then it is necessary to conceptually follow the same technological equipment from the same manufacturer / supplier as the existing ones. If it is not possible to use equipment of the same type to extend the existing technological unit (e.g. no longer manufactured, no spare parts available, etc.), other type from the same manufacturer with the same parameters of the original equipment can be used. In case adequate replacement from the original supplier / manufacturer with the required parameters is not available, technology from another manufacturer / supplier can be implemented in the existing technological unit. In this case, it has to be determined which supplier / manufacturer bears the operating guarantee including the service activity for the whole technological unit.

Equipment changes, including technical design and execution shall be agreed on with PSU/3 and ŠE TS in advance.

3.7 Service conditions of technological units

In order to maintain functionality, operational reliability, quality and, above all, warranty of individual technological units, any supplier of all equipment for Škoda Auto a.s. is under obligation that service activities, including replacement of original spare parts, will be carried out by their own service department or through their authorised contractors with documented authorisation certificate.

It is not permissible for these devices to be serviced by an unauthorised company and that used or secondary spare parts are used within the service.



3.8 Cooling water quality in closed systems

The water does not come into contact with the outside environment, cooling is achieved in another heat exchanger or cooling machine. The added water to the closed system is usually softened or demineralized to minimize lime salts. **Softened or demineralized water** is used for **closed** cooling circuits. The main reason is to minimize the presence of calcium in the cooling water. Minimizing the presence of calcium prevents the formation of hard deposits on the most sensitive devices, especially on devices with a high thermal load, and on devices with significant influence on the smoothness and quality of production.

Typical water parameters for closed cooling circuits used in ŠKODA AUTO a.s. (recommended ranges for trouble-free operation)

parametr	jednotka	Rozmezí
pH	-	9,0 – 11,0
vodivost	uS/cm	150 - 750
Ca tvrdost	mmol/l	< 0.3 (max. 0,5)
m-alkalita (KNK4,5)	mmol/l	2,5 - 8
chloridy	mg/l	< 120
sírany	mg/l	< 200

3.8.1 Cooling water treatment in closed systems (use for cooling water in production facilities)

Closed Cooling Circuit (UCHO) - Required quality of refilling water is demi-water with subsequent chemical "toning"

The source of input raw water is industrial water. The technology of this industrial water treatment must meet the following technological and technical parameters:

1. Filtration of fine mechanical impurities using automatic duplex filters with ceramic media.

The filters must be duplex (one control valve for 2 tanks) with automatic flushing and a volume non-electric control valve. The filters do not require electrical connection. The required filter medium is Ceramic-cERalit, the particles of which are of the uniform size of 0.35-0.20 mm, highly porous structure and large surface area providing a high filtration capacity of the medium with a filtration efficiency of 3 microns. The medium must show almost zero operating wear.

2. Water softening by means of a softening cation exchange station in a duplex design.

The softening station consists of a pair of tanks (= duplex) with a heavy acid cation filling and one non-electric control valve with volume control of regeneration according to the amount of treated softened water. Part of this is a brine tank for regeneration salt. The softener does not require electrical connection.

The station must produce treated softened water even during regeneration.

Countercurrent regeneration with softened water is required = higher efficiency of regeneration = half salt consumption = economical operation = ecological system minimally burdening wastewater "RAS" (dissolved inorganic salts).

3. Dechlorination of water and removal of organic derivatives by means of an activated charcoal filter.

4. Water disinfection with UV emitter.

5. Safety filtering with filter element with efficiency up to 1 micron.

6. Water desalination using reverse osmosis

RO nominal power must be based on input water temperature of 10 °C with a pressure of 3 bar.

The RO unit includes a Grundfos high pressure pump for inlet water on membranes, membranes in stainless steel covers, permeate and concentrate flowmeters, control and regulation valves, manometers, pressure sensors, all pre-assembled and mounted on a stainless steel frame.

RO must be equipped with a PLC control unit (PROFACE) with a LCD display for displaying RO station operation indicators with possibility to be connected to the superior MAR system. Automatic programmable operation rinse, rinsing at start, low pressure inlet water pressure control with automatic shut down, RO start / stop remote control, CIP preparation and conductivity meter for conductivity reading.

7. Accumulation of treated demi-water in the tank.

8. Draining of treated demi-water from storage to UCHO using a pump station with 2 pumps (100% backup) controlled by frequency converter.

9. Subsequent chemical toning of demi-water - dosage of corrosion inhibitor and biocide

10. Two-stage side filtration of circulating cooling water in UCHO using automatic filters, the flushing of which is ensured by an external source of wash water

10.1. Filter with automatic flushing - 40 micron filtration efficiency - **flushing with external water**

Flow* (40 µm)	7 m³/h	11 m³/h	14 m³/h	18 m³/h	21 m³/h
Water pressure for flushing min.	5 bar (40 µm) - external washing water				
Filter area	1760 cm²	2640 cm²	3520 cm²	4400 cm²	5280 cm²
Filter volume	2296 cm³	3444 cm³	4592 cm³	5740 cm³	6888 cm³

* Flow through the filter depends on input water pollution and selected filtration efficiency



10.2. Filtration of fine mechanical impurities by means of automatic filter with ceramic medium - **flushing with external water**
The filters must be automatically flushed with external water. The required filter medium is Ceramic-cERalit, the particles of which are of the uniform size of 0.35-0.20 mm, highly porous structure and large surface area providing a high filtration capacity of the medium with a filtration efficiency of 3 microns. The medium must show almost zero operating wear.

3.8.2 Cooling water treatment in open systems

(use for spraying water in cooling towers)

Open cooling circuit - required refilling water quality is filtered and partially softened water followed by chemical "toning"

The source of input raw water is industrial water. The technology of this industrial water treatment must meet the following technological and technical parameters:

1. Filtration of fine mechanical impurities and iron by means of automatic duplex filters with ceramic media.

The filters must be duplex (one control valve for 2 tanks) with automatic flushing and a volume non-electric control valve. Filters do not require connection to electricity. The required filter medium is Ceramic-cERalit, the particles of which are of the uniform size of 0.35-0.20 mm, highly porous structure and large surface area providing a high filtration capacity of the medium with a filtration efficiency of 3 microns. The medium must show almost zero operating wear.

2. Partial softening of water by means of a softening cation station in a duplex design - guaranteed total hardness of 3 - 4 ° N in treated water

The softening station consists of a pair of tanks (= duplex) with a heavy acid cation filling and one non-electric control valve with volume control of regeneration according to the amount of treated softened water. Part of this is a brine tank for regeneration salt. The softener does not require electrical connection.

The station must produce conditioned softened water even during regeneration.

Countercurrent regeneration with softened water is required = higher efficiency of regeneration = half salt consumption = economical operation = ecological system minimally burdening wastewater "RAS" (dissolved inorganic salts).

3. Subsequent chemical tonicity of water - dosage of corrosion inhibitor and biocide

4. Side filtration of circulating spraying cooling water by means of automatic filters, the **flushing of which is ensured by internal or external source of washing water**

Automatic flush filter - 100 micron filtration efficiency - internal or external water flushing.

Flow* (100 µm)	13 m³/h	20 m³/h	26 m³/h	33 m³/h	40 m³/h
Water pressure for flushing min.	3,5 bar (100 µm) - internal or external washing water				
Filter area	1760 cm²	2640 cm²	3520 cm²	4400 cm²	5280 cm²
Filter volume	2296 cm³	3444 cm³	4592 cm³	5740 cm³	6888 cm³

Flow* (100 µm)	56 m³/h	70 m³/h	84 m³/h	98 m³/h	112 m³/h
Water pressure for flushing min.	3,5 bar (100 µm) - internal or external washing water				
Filter area	7040 cm²	8800 cm²	10560 cm²	12320 cm²	14080 cm²
Filter volume	9184 cm³	11480 cm³	13776 cm³	16072 cm³	18368 cm³

Flow* (100 µm)	105 m³/h	140 m³/h	175 m³/h	210 m³/h	245 m³/h
Water pressure for flushing min.	3,5 bar (100 µm) - internal or external washing water				
Filter area	13200 cm²	17600 cm²	22000 cm²	26400 cm²	30800 cm²
Filter volume	17219 cm³	22959 cm³	28698 cm³	34438 cm³	40177 cm³

* Flow through the filter depends on input water pollution and selected filtration efficiency

4 Components and suppliers used with priority in Škoda Auto:

1) pipes -

- rust-free AISI 316L - Armatury Group a.s., Italinox
- plastic-treated/ zinc-treated pipes - Technicoat Rilsan (flange connections) and Alvenius (grooved connections)
- Zinc-treated pipes (grooved connections) – Alvenius – Societe Uhlik, Synklad Energy
- zinc-treated pipes
- shaped alloy with lining by Saint-Gobain, vonRoll Hydro (cz) (formerlyDuktus)
- polyethylene +GF+, Simona, PipeLife, Nicoll (formerly Glynwed)
- polypropylene +GF+, Simona, PipeLife, Nicoll (formerly Glynwed)
- aluminium LegrisTransair (Parker), Teseo
- pressed galvanised / stainless steel pipes - Mapress, Sanha
- steel ČSN 425710, 425711, 425715

2) fittings

- Tran-Sig-Ma, Hawle, Armatury Group a.s., South Moravian fitting plant, +GF+, KSB, Valve.cz, Moravia Systems, Pettinaroli (Ivar.cz) - (water)
- KSB, Tran-Sig-Ma, +GF+, Valve.cz, Armatury Group a.s., Pettinaroli (Ivar.cz) - (compressed air, gas)
- for cooling (water 6/12 °C), fittings should be used like for water
- ball valves ≤ DN 50 (water, compressed air) - ball valves must contain manufacturer's label and parameters on body or lever

3) compensators BBA

4) balancing valves for cooling water (welding facilities) - BOA Control KSB

5) servo valves with compressed air, cooling water - Valve.cz, Festo

6) Groove connectors - Victaulic, Grinnell

7) Double-sided plastic-treated/zinc-treated pipes - Alvenius-Societe Uhlik

8) laying of pipes, hinges - Hilty, Müpro, Walraven, Sikla

9) pumps

- KSB, Sigma, Grundfos, Flyght, Wilo, Zehnder

sludge pumps

- Zehnder, KSB

10) cooling towers - B.A.C. Baltimore Aircoil, AW COOL, Veskom - cooling water

11) filters - Earth Resources, Amiad – (cooling, drinking, industrial and de-mineralised water)

- Zander, Donaldson, Hankinson, Festo, Ultrafilter BEKO Technologies – (compressed air)

12) water treatment facilities - Earth Resources, AW COOL

13) padding of sewers – UV Liner Trasko, Brochier

14) renovation of sewers, digless technology – Trasko, Brochier

15) waste water treatment plants - Fontana R, Arko

16) cooling compressors - York, Trane, AW COOL, Veskom – (production of cool water (6/12°C)

17) compressors – Atmos, Atlas Copco, Kaeser, Ingersoll-Rand, Cooper, Veskom – (production of compressed air 6, 8, 12 bars)

18) pressure vessels, zinc-treated pressure tanks - see. ITS 6.21 Stable pressure tanks

19) chemicals for water/cooling circuits – NALCO

20) compressed air dryers, compressed air treatment plants - Atlas Copco, BEKO Technologies, Parker Hiross

5 Disassembly, waste disposal**5.1 Disassembly of existing equipment**

Existing piping, hinges, laid pipes, supporting steel structures, fittings and all structural elements and equipment, such as tanks, pumps, warmers, coolers etc. can be disassembled only if permission is obtained from VP Škoda Auto professional divisions.

5.2 Waste disposal**5.2.1 Liquidation of iron waste**

During technical negotiations, based on project documentation the extent, type and amount of disassembled material must be agreed upon. Iron waste can be transferred to the ownership of the supplier company, under the condition that the yield from the waste will be deducted from the supplier's total offered price.

5.2.2 Non-iron waste disposal- environmentally friendly disposal

During technical negotiations, based on project documentation the extent, type and amount and environmental impact of disassembled material must be agreed upon.

For disassembly and subsequent environmentally friendly disposal of waste (including components from oil-treated waters, ammonia and other chemicals, pipe insulation, plastics, plastic pipes, etc.), it is necessary to follow Škoda Auto's Organisational Guideline 1.0312 regarding waste handling.

(EXCEPT EL. ENERGY)

Energy	Quality	Nominal pressure PN [bars]	Operating pressure in network [bars]	Proposed temperature [°C]	Note + consuming facilities
Pressurised air 6 bars from KS E5 and E14	ČSN ISO 8573	10 - 16	5.8 - 6.3	20	entire plant
Pressurised air 12 bars from KS E14	ČSN ISO 8573	16 - 25	11 - 12	20	M12A,B,C,D,E,M14, M2
Pressurised air 8 bars from KS M11B	ČSN ISO 8573	16 - 25	8.5 - 9.5	20	M17
Natural gas	warming 34MJ/m ³	40 - 63	37	15	entry to plant
	warming 34MJ/m ³	6	2.5	15	E1A
	warming 34MJ/m ³	6	1.7	15	M16,M17,E30,D13,M13,M7
	warming 34MJ/m ³	6	0.2	15	M1,M2, H2,H3,M3,D16
	warming 34MJ/m ³	6	0.02	15	V4,ZC,V12,V8,V14
Drinking water	Decree 252/2004 Coll.,	10 - 16	3 - 5	15	entire plant Max. temperature at full opening of the outlet for 30 seconds is 25 °C
Industrial water	Parameters upon request from SE-TI	10 - 16	5 - 7	15	entire plant
De-mineralised water Z10	Parameters upon request from SE-TI	10 - 16	4.5	15	M16,M17,M18,M2,E1A (Prospectively M6)
Cooling water Z6	Parameters upon request from SE-TI	10 - 16	4.5	25/32	21,5/25°C=operating temperatures H2,H3,M2,M4,M5
Cooling water E14A	Parameters upon request from SE-TI	10 - 16	3.6	22/25	21/23°C= operating temperatures M12B
Cooling water E14B	Parameters upon request from SE-TI	10 - 16	5.5	21/27	19/23°C =operating temperatures M12B,C,D,E
Cooling water M 14	Parameters upon request from SE-TI	10 - 16	5.7	24/27	19/21°C =operating temperatures M 14
Cooling water Z24	Parameters upon request from SE-TI	10 - 16	6	24/31	21/26°C= operating temperatures M16,M17,M12A,M15,M14(advance)
Cooling water Z30	Parameters upon request from SE-TI	10 - 16	5,5	28/33	21/23°C= operating temperatures M6 M18
Cooling water Z33	Parameters upon request from SE-TI	10 - 16	3	28/32	25/27°C= operating temperatures M18
Warm service water	Parameters upon request from SE-TI	6	3 - 5	55	entire plant Max. temperature is lower than 60°C
Heating incoming hot water	Parameters upon request from SE-TI	16 - 25	9 - 13	130/85	entire plant summer operation 80/60°C
Heating reversible hot water	Parameters upon request from SE-TI	16 - 25	10	70	entire plant

Use of nominal pressure PN, see chapter 3.2 Structural elements / Fittings - manometers